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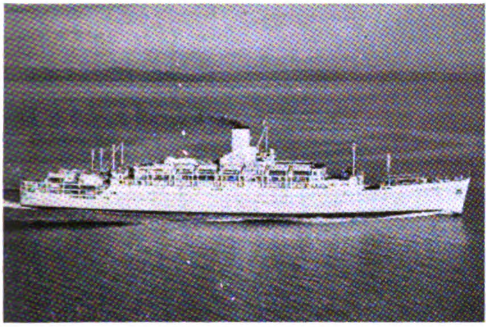

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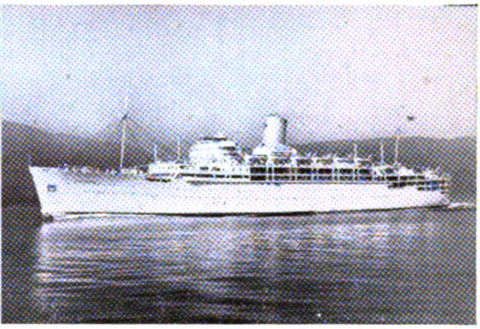

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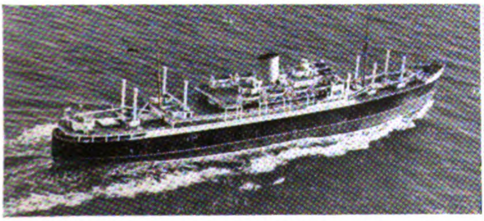

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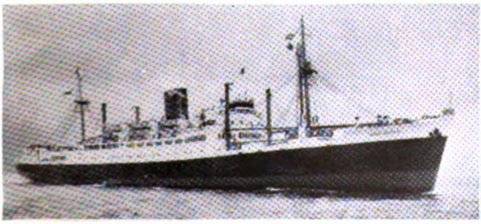

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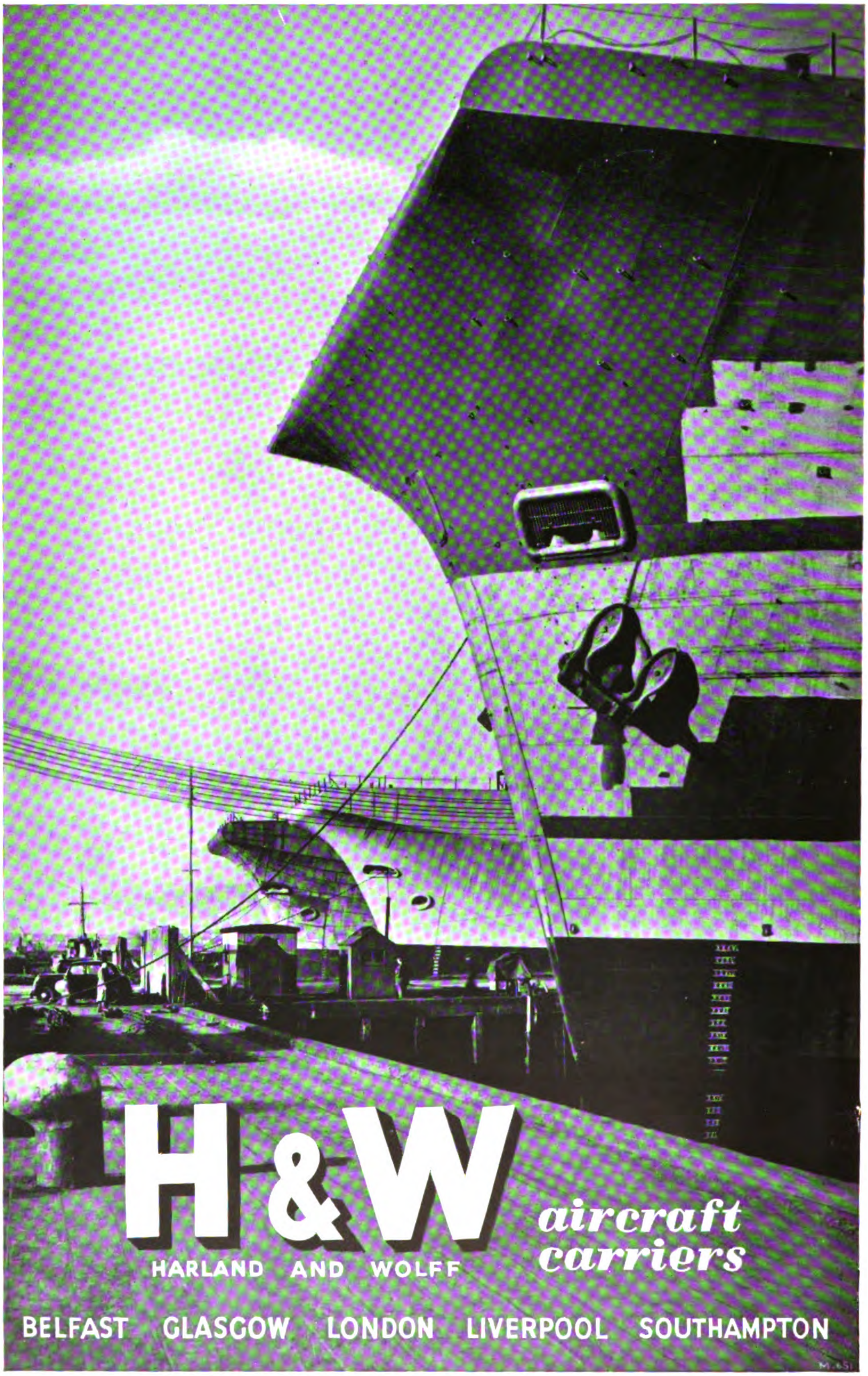
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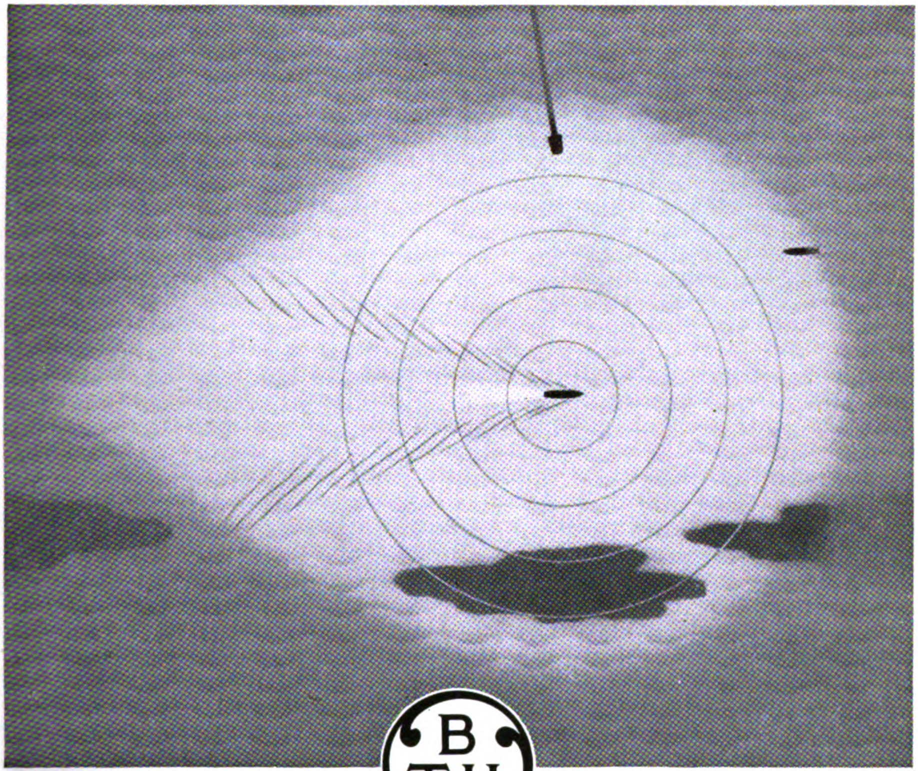

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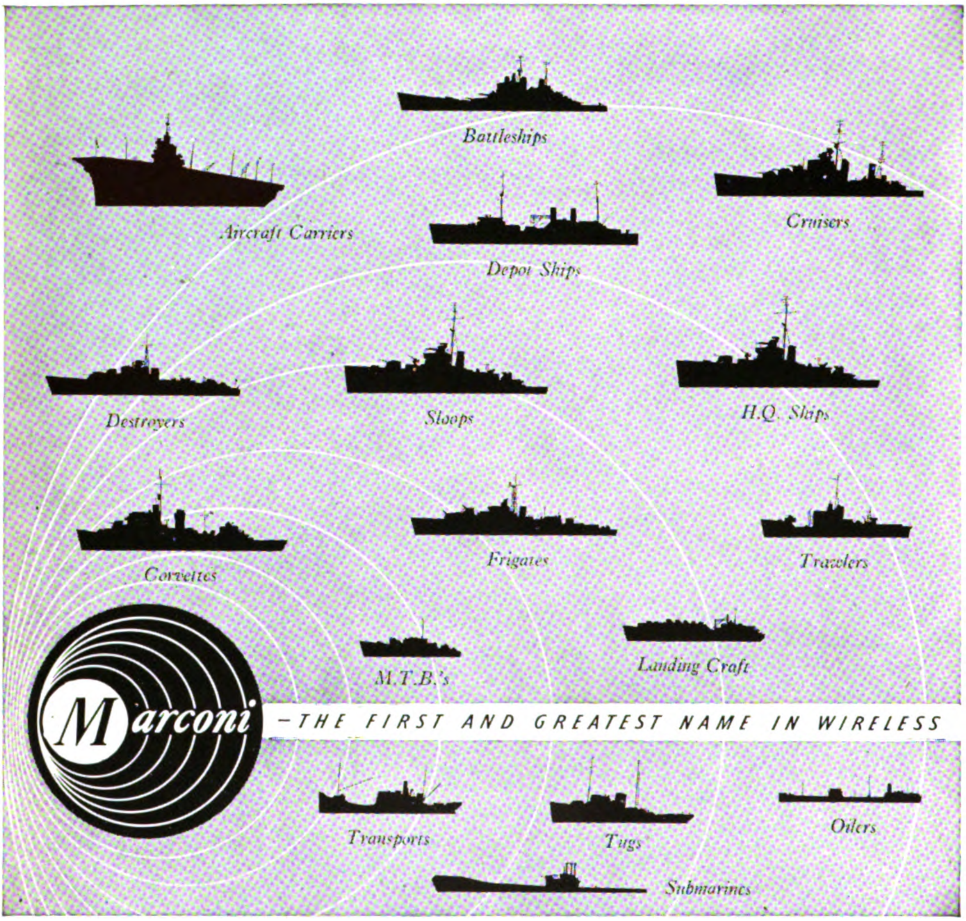

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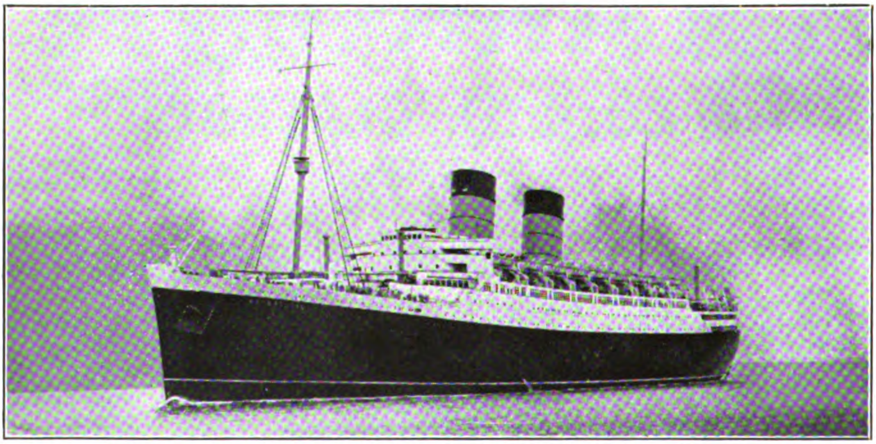

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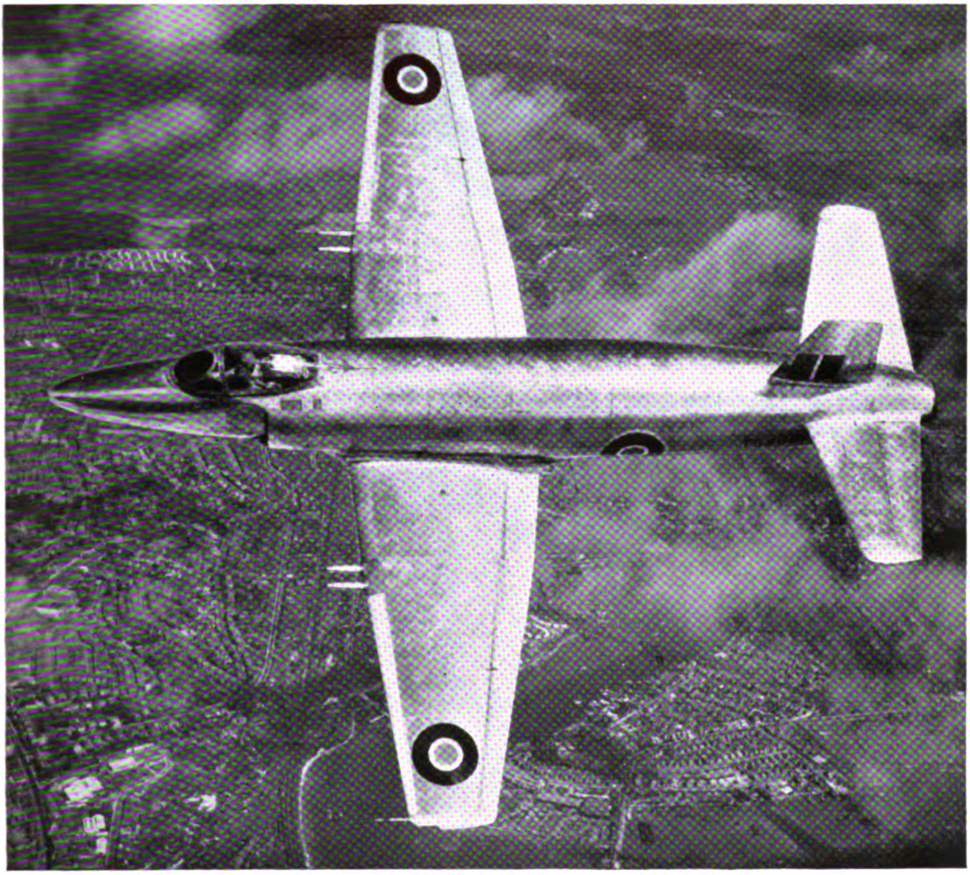

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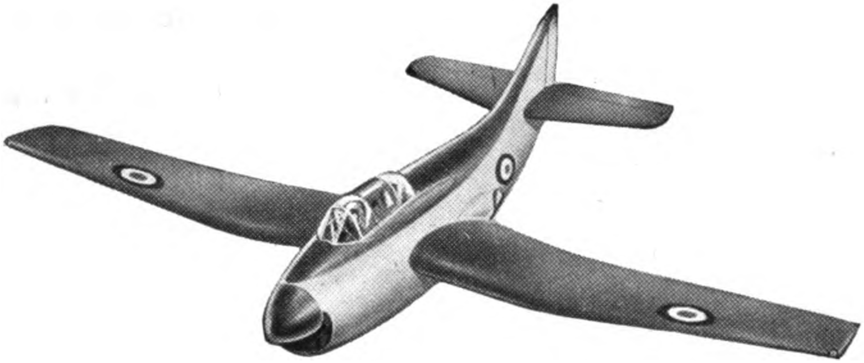

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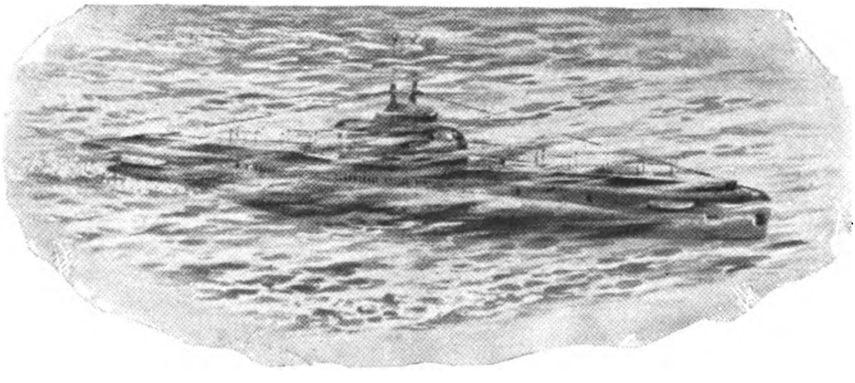

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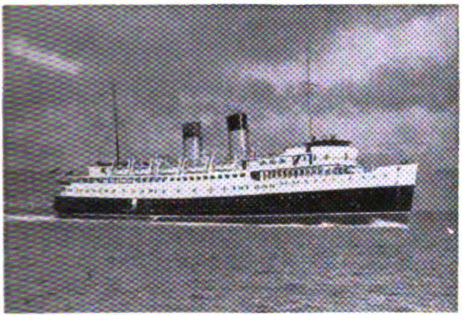

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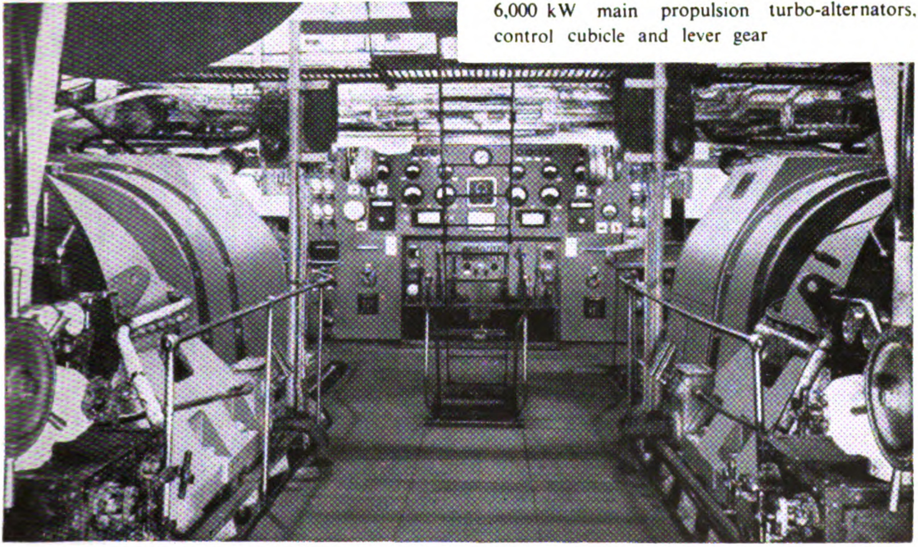

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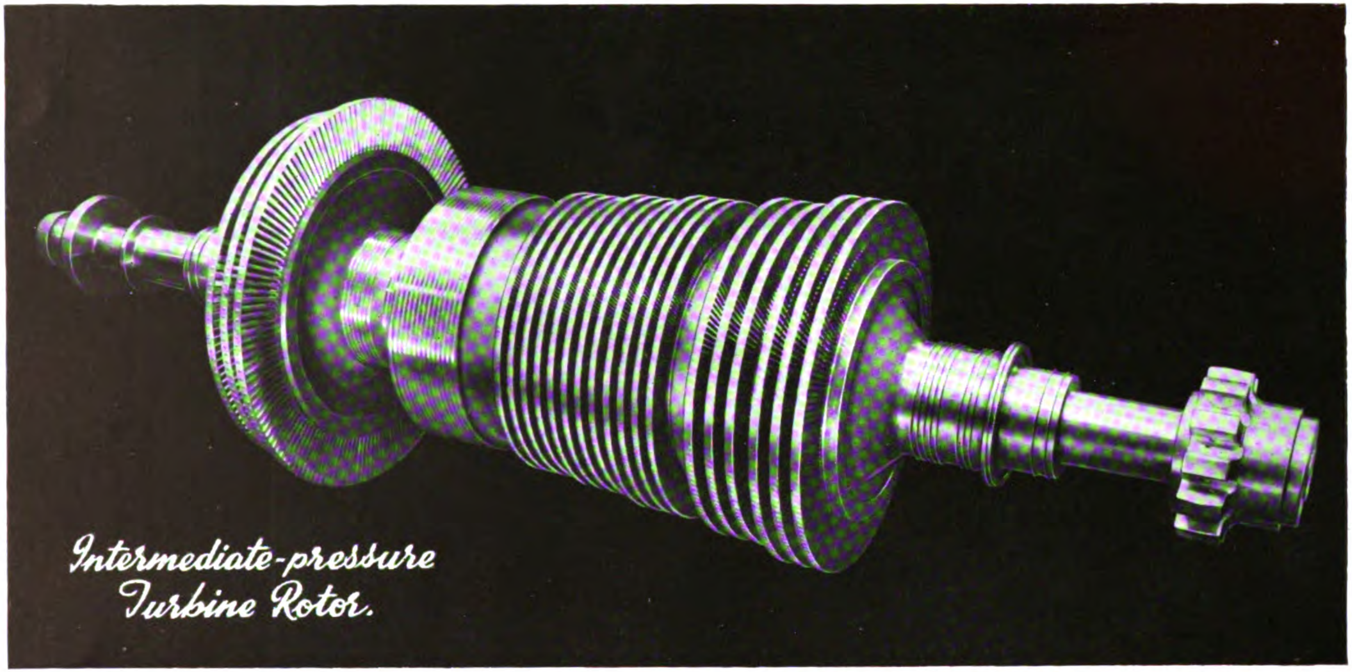

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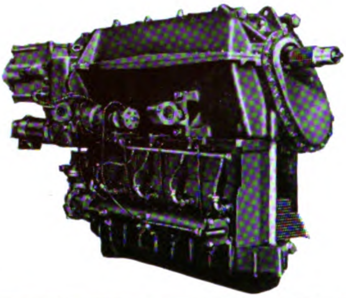

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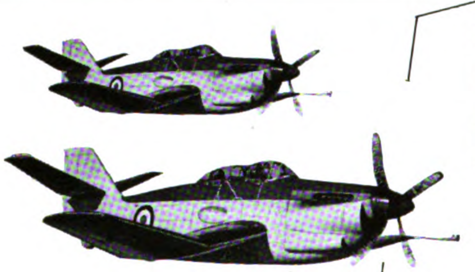

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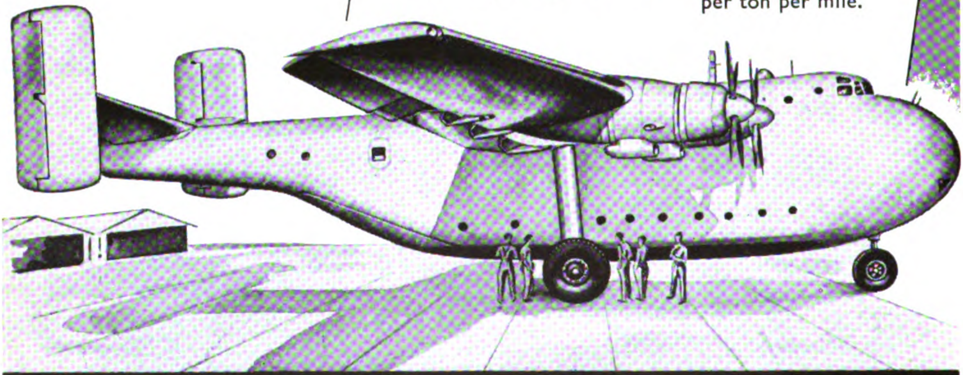

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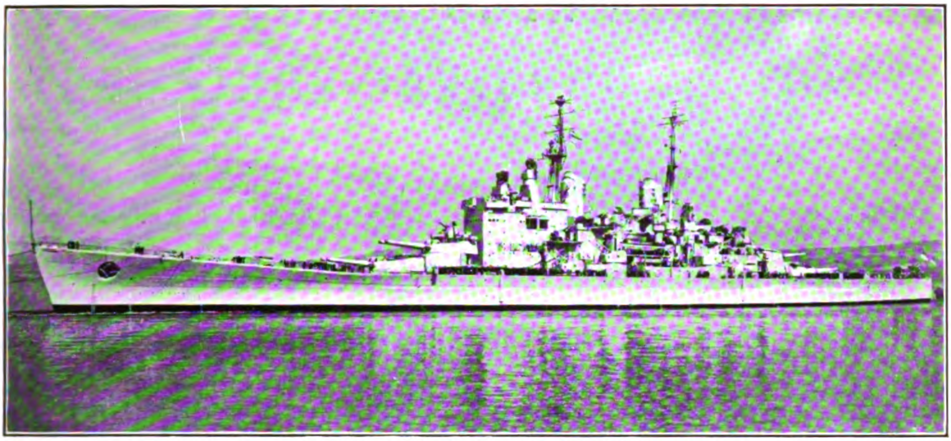

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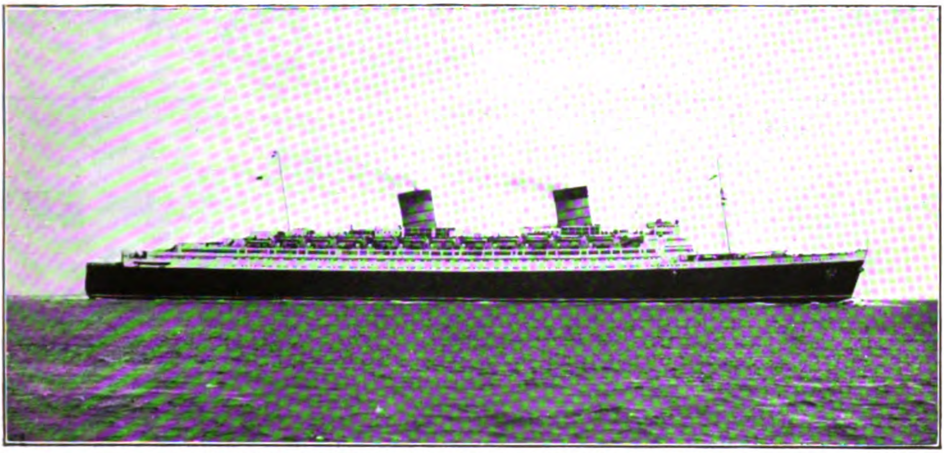

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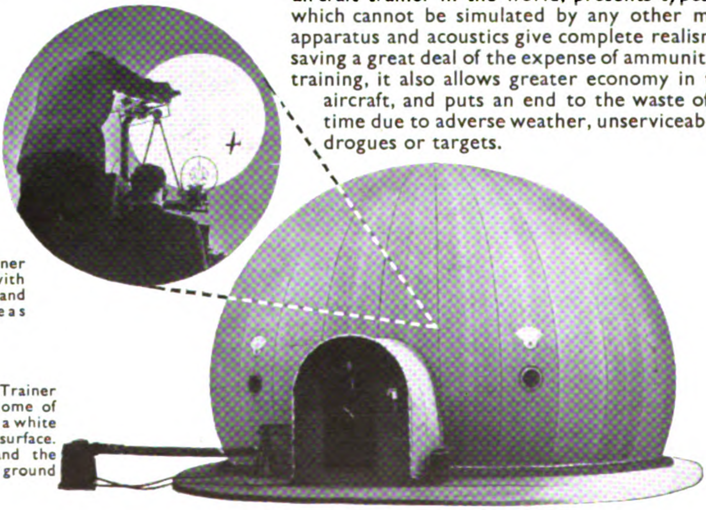

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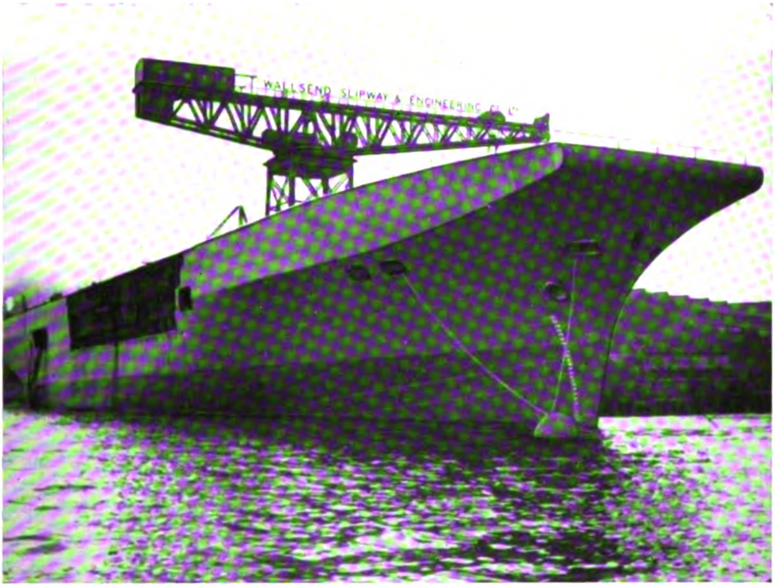

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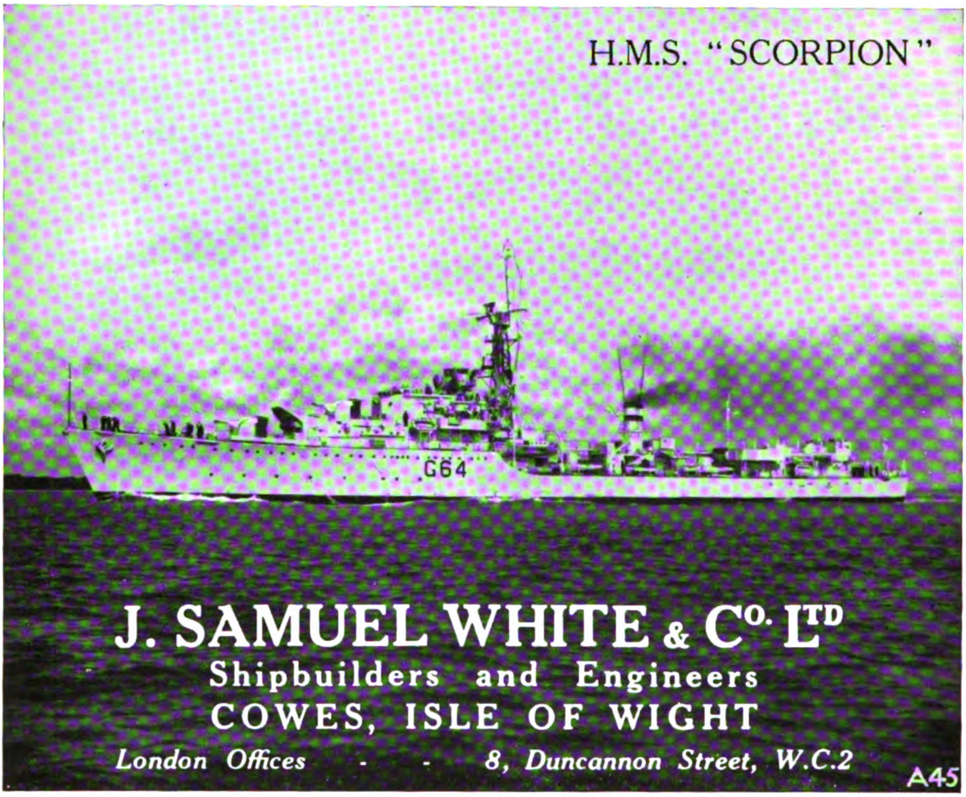

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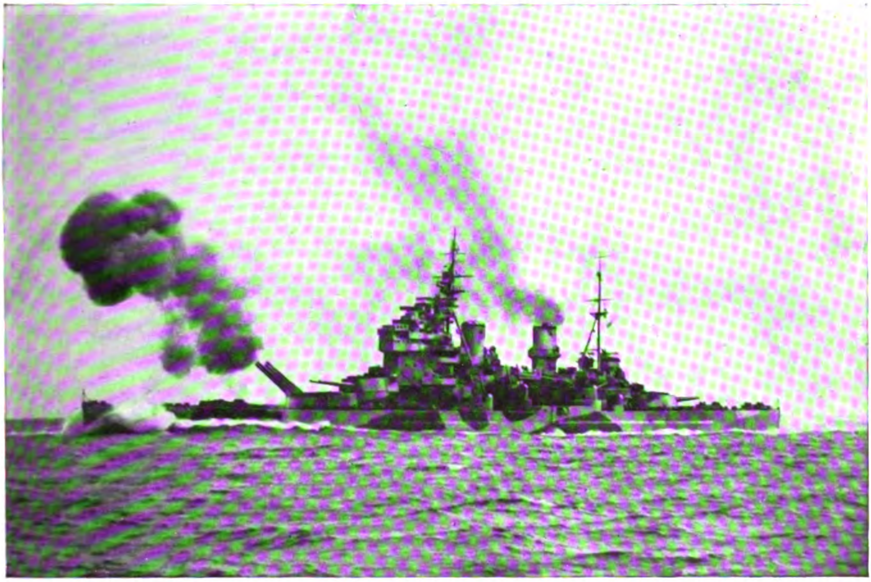

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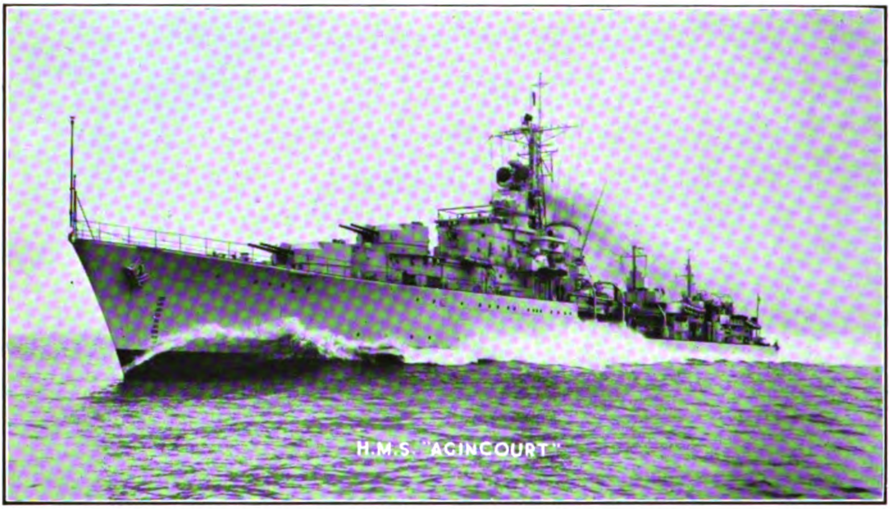

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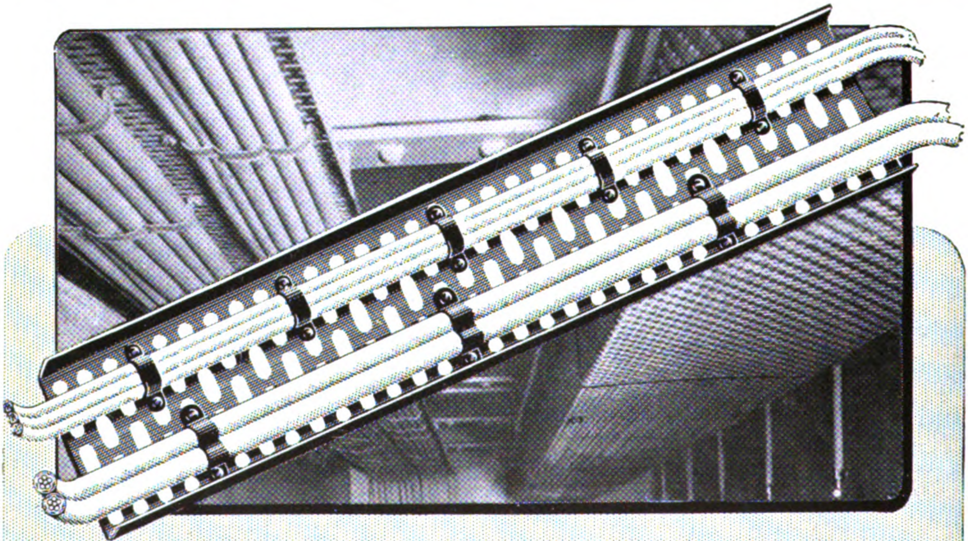

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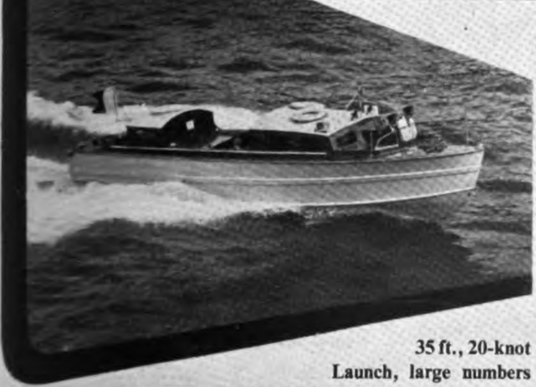

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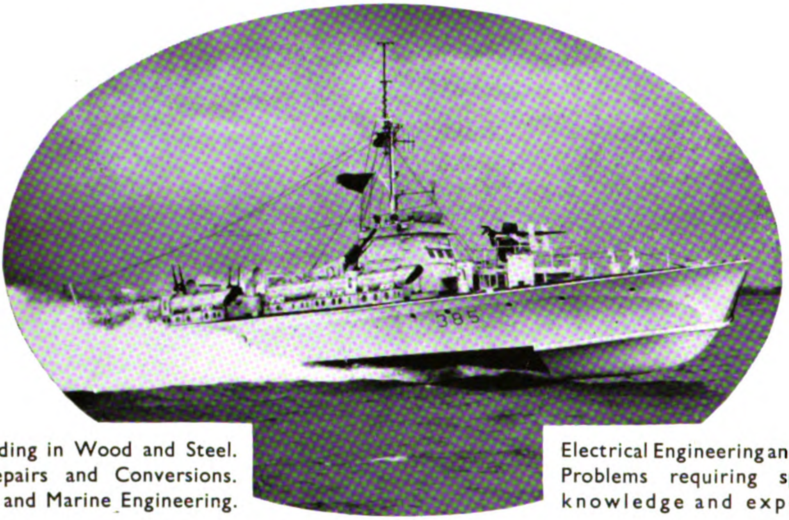

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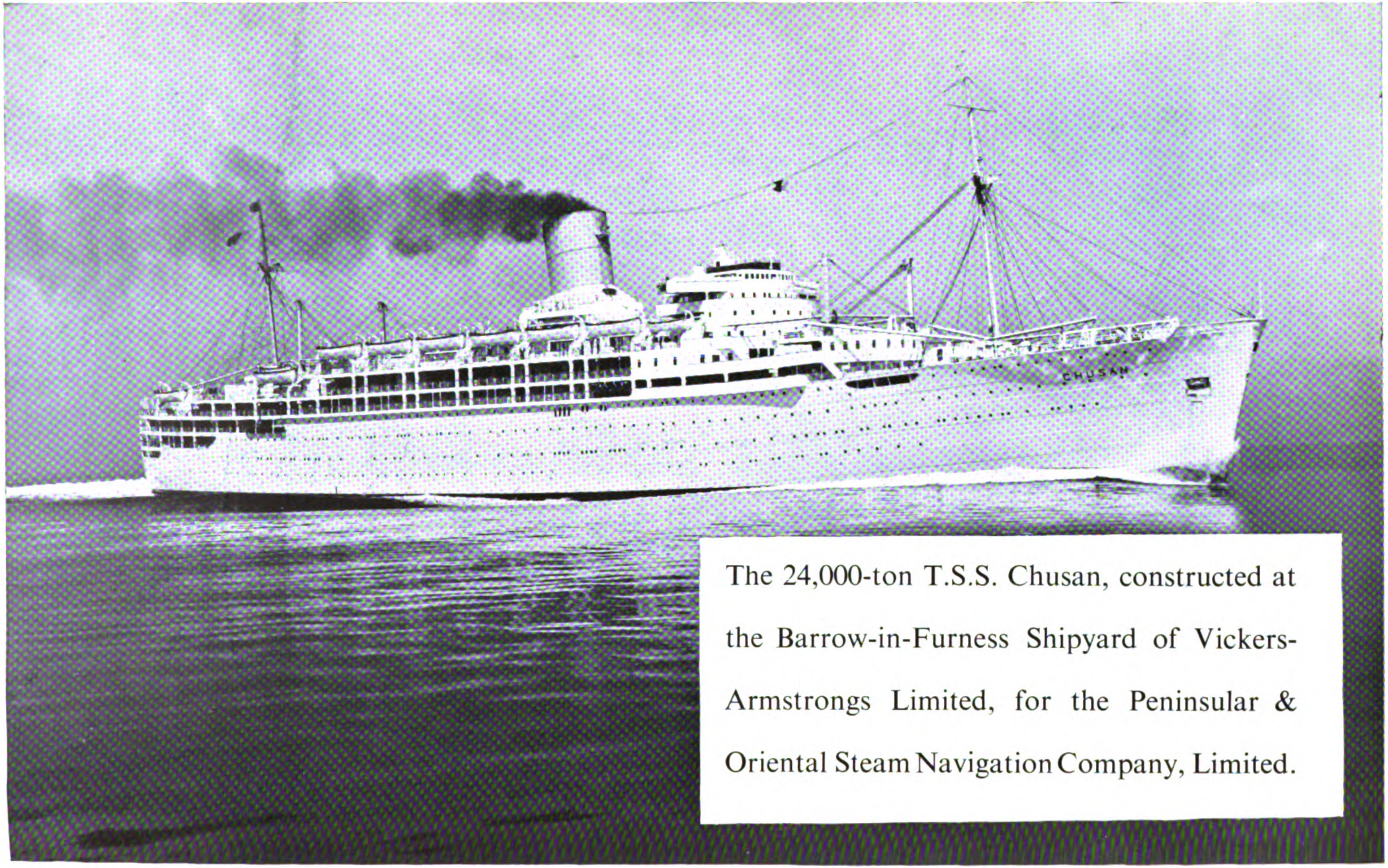

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PREFACE

THIS year " Brassey " appears in a new form, which is, however, in reality no more than a logical development from that to which its regular readers are accustomed. As the reasons for this development and its details are set out fully in Chapter I which follows, I will not enter into them here further than to say that it is the hope of the Editors that in future it will be able to serve all three of the Armed Forces with the same loyalty that has hitherto been given to the Navy. It is also their hope that outside the Services, those readers whose interests are chiefly concerned with any one of the three will find the volume as reliable a guide to Service organization, progress, and opinion as it has ever been in respect of the Navy alone. In thus transforming Brassey's " Naval Annual " into " The Armed Forces Yearbook " I have had the welcome assistance of Brigadier C. N. Barclay—whose name is well known in the Army as the editor of *The Army Quarterly*—and Air Vice-Marshal W. M. Yool.

An Annual in book form has necessarily to go to print several months before its actual publication, and it thus differs from periodicals of shorter term, which endeavour to deal with the events of the moment. Its object, carrying on a series which has extended over more than half a century, is to review the events, developments and opinions of the year past and to keep before the public the importance of national defence and of the Services on which, when the test comes, the largest burden of it falls. Its contents should therefore appeal not only to members of the Services themselves—to whom it is hoped that the running record of facts and events will be useful—but also to those members of the general public who take an interest in Service affairs that is more than merely superficial. In this issue, being the first to deal directly with the Army and Air Force as well as the Navy, we have included rather more past history, in the shape of chapters dealing with gradual development up to the present, than either has been included in the past or is to be expected in future issues ; and in order to present a comparative review of an important aspect of administrative development, we include parallel chapters, written by separate authors, of the conditions of service in each.

Though its primary object is to serve the interests of the Armed Forces, as it did those of the Navy in the past, " Brassey's Annual " has never been up to now, and will not be in the future, in any way official in the sense of being officially controlled or even officially inspired. The opinions expressed are free, and are the responsibility of their authors, or of the editor if the author's name is not disclosed, alone. At the same time, the editor has always been in close relations with the Admiralty in the past, and has been successful in achieving his object of making the Annual of service to the Navy, and thereby preserving those good relations. That record, no doubt, is responsible for permission having been granted by the War Office to serving staff officers to contribute certain chapters which follow—XVII and XIX ; but as those chapters are purely factual, the fact that they have been written by serving officers does not indicate any departure from " Brassey's " tradition of independence. It should, however, be emphasized that independence does not connote irresponsibility. The greatest care will be taken to ensure that, in the future as in the past, no information shall appear that is not authoritative. Considerations of security preclude the publication of much information about the Services, but information which is not officially so barred is, as far as the editors are able to ensure, reliable ; and gossip or speculation on matters which are officially secret is rigidly barred from our pages.

This issue has been arranged in four main sections. The first deals with matters connected with defence as a whole, the other three each with one of the Services, on the pattern of past issues which concerned the Navy alone. On the all-important subject of the Atlantic Treaty and Western Defence—which has had no test up to the time of going to press—Colonel Wyndham contributes a lucid exposition of the organizations that have been set up to give effect to the intentions of their framers ; and the same author contributes a thoughtful analysis of the influence of new weapons upon the conduct of war—a subject that has been often ventilated, on lines more sensational than authoritative, in the popular press. On the higher conduct of War, Captain Liddell-Hart contributes a thoughtful essay on the Objective in War, while Sir Robert Saundby deals with a cognate aspect of the same problem in his chapter on the Influence of the Third Dimension in war, and Mr. Jules Menken writes of the organisation which provides for the Central Direction of War. The organisation for collaboration between the Armed Forces of the countries of the British Commonwealth is described by Lieutenant-Commander Kemp—whose name will be familiar to readers of former issues of " Brassey " as the author of the chapter on Foreign Navies, on which he again writes this year ; and the problem of standardisation of fighting equipment—upon which it is hardly possible, from considerations of security, to write in any great detail—is reviewed by Lieutenant Kennett, also an old contributor.

In the Navy Section, the subject of Carriers and their Aircraft is dealt with by another old contributor who writes under the *nom de plume* of " Volage," while another pseudonymous writer expounds the problem that is perhaps of the highest priority in the Navy to-day, that of how to deal with submarines of the future. Lieutenant-Commander Hall, the Naval Correspondent of the *Daily Telegraph and Morning Post*, describes the conditions of service in the Navy to-day.

In the Army Section, the introductory chapters and the final chapter on Current Army Problems are contributed by Brigadier Barclay, who has also acted as editor of the section. General Martin, the Military Correspondent of the *Daily Telegraph*, describes the three principal foreign armies of the world to-day, while the chapters on Army Equipment and Conditions of Service have been contributed, as already noted, with official permission, by serving staff officers. Army Training is described by a contributor who, like his naval colleagues, prefers to remain anonymous—as does the author of the corresponding chapter in the Air Force Section.

In the Air Force Section, Air Vice-Marshal Yool, the editor of the section, writes the two introductory chapters. The technical chapter is written by Group Captain Williamson, who is an acknowledged authority in this sphere. Mr. H. F. King, Assistant Editor of *Flight*, contributes a comprehensive review of Foreign Air Forces, while the manning and conditions of service of the Royal Air Force are described by that well-known writer on air matters, Mr. Colston Shepherd.

In conclusion, the editors would like to express their appreciation of the courtesy and ready assistance they have received from all those, in official and other positions, British and foreign, to whom they have applied for information in the course of compilation of this issue.

H. G. THURSFIELD

P.S.—The whole of this issue of "Brassey," including this Preface, was completed for press just before the Communist aggression in Korea made it necessary for the Members of the United Nations not only to provide forces in the field immediately to resist that aggression, but also to revise their somewhat over-complacent attitude to the problems of defence in general, and to initiate steps to bring their Armed Forces up to a level more nearly corresponding to probable needs of the day. Mr. Shinwell, in the debate in Parliament on defence just after the Korean fighting started, stated that the present position of the United Kingdom forces fell far short of requirements. The employment of the Far Eastern Fleet on active service in collaboration with the Navies of the U.S. and Commonwealth countries made it necessary for the Admiralty to bring the complements of its ships, and of those ships sent to reinforce it, up to war complements in place of the peace complements hitherto borne. The decision of the Government to send a self-contained British land force to take part in the Korea operations created a need for increase in the numbers of the Army. It was necessary for the strength of the Royal Air Force to be increased in step with the other Services. All three, therefore, took the steps of suspending discharges of time-expired men and took power to call up certain categories of the Reserves; these measures, with the steps necessary to ensure that the larger numbers should be adequately equipped, were estimated to involve an extra expenditure of £100,000,000, not all of which, however, would fall in the current financial year.

These were immediate measures only; a few days later, the Government announced its longer-term decisions regarding the scaling-up of defence measures in general. The occasion for this announcement was the British reply to a request addressed by the United States to all the parties to the Atlantic Treaty for information as to the measures the latter were prepared themselves to take in strengthening their forces, upon which the United States could reach a decision upon the allocation of the military aid to be granted to them from United States funds. The memorandum is to be found in full at the end of the Reference Section of this volume; summarized, it foreshadows a total expenditure on the expansion of the Armed Forces of some £3,400,000,000 spread over the next three years. Neither the details of the measures so provided nor the part of the cost that would fall on British funds could be set out at that stage; but the Memorandum indicates the magnitude both of the needs of defence and of the burden that it will place on the country's economy.

A few weeks later the decisions to recommend to Parliament an increase in the length of National Service from eighteen months to two years and to make substantial increases in the " Pay and Emoluments " of the Armed Forces were announced in a broadcast address by the Prime Minister. It has not, of course, been possible to revise Chapters XIV, XX and XXVII in accordance with these changes, and they therefore remain as they were written earlier. But the White Papers giving details of the new scales are given at the end of the book. It is estimated that the full annual cost of these measures will be nearly £70,000,000.

H. G. T.

CHAPTER I

BRASSEY IN NEW GUISE

IF THERE was one lesson of the late war which stood out unmistakably and clearly, it was that strength in war lies not in any one weapon, arm, or Service but in the full and close collaboration of all, directed to one end. There is, indeed, nothing new about this principle. More than half a century ago that very discerning student of the art of war, the late Colonel Henderson, pointed out that throughout the wars of the eighteenth century it was found necessary to devote all the national effort, by land as well as sea, in the first place to securing command of the sea, in order that the land forces of the Crown might be enabled to exert their full power. Yet it did not stand out so unmistakably in the past, for there were immense fields of operations in which the two arms, Navy and Army, were hardly conscious of each other's existence or activities. The officers and men of the fleets of Nelson, maintaining the blockade of Toulon from 1803 to 1805, and of Cornwallis, doing the same off Brest, would hardly have agreed that their campaigns had anything to do with the Army, or *vice versa;* but their admirals knew better, even if the connection appeared from time to time somewhat remote.

When Nelson was following on Villeneuve's heels after his escape to the westward, one of his preoccupations before actually pursuing to the West Indies was the safety of the millitary expedition under Knight and Craig which was on passage south from England bound to the Mediterranean. Cornwallis's chief task was to prevent Ganteaume from slipping out of Brest and up Channel to cover the passage of Napoleon's "Army of England" from Boulogne and Calais to these shores; and that, indeed, was also ever at the back of Nelson's mind in the Mediterranean. The chief reason why Collingwood was kept on, long after the Battle of Trafalgar, in the Mediterranean command until it killed him, in spite of his fatigue, his failing health, and his repeated requests to be relieved on those accounts, was that he, better than any possible successor, understood the complex European situation and the immensely important part in it played by the British sea forces in the Middle Sea, not merely as a fighting force *per se*, but as one part of a great whole. Collingwood was not killed in battle or by exposure to the elements, but by the confinement to his writing-desk, to which he was condemned by the task of conducting what was in effect a vast combined operation. Wellington in the Peninsular War was under no illusions regarding the amphibious character of his campaign. He was ever conscious of his dependence on sea-borne supplies, assured to him by British command of the sea.

Yet the lessons of war tend ever to be forgotten when peace lessens their urgency. Just as the Fighting Services themselves have commonly been neglected and starved as soon as peace has diminished the urgency of the nation's dependence upon them, so the Navy and Army, after working together in the closest collaboration and harmony in the face of an enemy, have tended to drift apart, into water-tight compartments, as it were, when

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there is no actual enemy to be faced. "Brassey's Naval Annual" had its origin in the determination of Sir Thomas Brassey, afterwards the first Lord Brassey, to put an end to the public oblivion of the nation's dependence for its survival upon sea power, to the national ignorance of the Royal Navy, and to its neglect of its interests—symptoms of the time of the tendency for the true role of defence forces to be obscured. As he saw the situation, the chief need of the day was to dispel public ignorance of and indifference to the Navy, the Service with which his own associations had been closest. That was clearly the first step to be taken.

The circumstances of the day, too, favoured the establishment of an Annual devoted to naval affairs alone. It was a period of naval rivalry and competition, growing out of the rapid technical development which was then transforming the principal navies of the world—all European at that time, for the Japanese Navy had not come into existence and the United States Navy was still under the eclipse to which it was condemned by a non-naval-minded Congress.* Lord Brassey saw the danger that, unless public realization of the country's dependence upon sea power were re-aroused, rival navies might well outstrip us in material naval strength. Defence as a whole depended primarily, as it ever had, upon command of the sea. The Army could neither be maintained at home nor transported and kept supplied abroad unless command of the sea were first assured. Lack of inter-Service collaboration was not then the insistent danger. The danger was more fundamental, that naval weakness, unless taken in time and made good, might undermine the whole national strength.

It was therefore "The Naval Annual" that Lord Brassey founded and conducted during the rest of his life; and it was "Brassey's Naval Annual" that has been carried on, since his death, by those on whom his mantle has fallen. In his time it was devoted very largely to material development, that being the predominant influence in naval progress throughout the world at that time. That tradition has been maintained to a great extent to the present day, though in the last fourteen years, during the present editor's tenure of office, the emphasis has been increasingly transferred to the strategical aspect of naval affairs and matters of personnel and policy. For many years after its foundation the "Naval Annual" was the only book of reference in which those interested in such details could look up the dimensions, armament, speed, and cost of the different principal warships of the world. That predominently material aspect of naval development, however, was afterwards taken up by other books of reference, devoted exclusively to it and more profusely illustrated, which have catered more comprehensively for those readers, and students, whose naval interests are exclusively technical. It was the aim of Lord Brassey, however, and of his successors in the editorship, to deal with naval affairs on a rather wider basis, and while providing an authoritative and reliable survey of naval affairs in general, to provide the public also with a sound exposition of the principles of national and imperial defence, and in particular of the Navy's place in the national defence organization.

The existence of an Annual devoted to the Navy alone has been to some extent a sympton of the tendency to "separatism" in the Fighting Services, of the tendency, in time of peace at least, to regard themselves as separate entities with no specialties uniting them to one another. That tendency became to some extent even more apparent with the creation of a third separate Service in the shape of the Royal Air Force; for there was inevitably, in a newly created Service, an urge towards asserting its own individuality and its independence of the older Services. Moreover, equally inevitably, there was a certain jealousy in the older Services, particularly amongst the elder members of them, of the upstart which claimed to assume some of their traditional functions, responsibilities, and even privileges. Such inter-Service rivalries, even strains, were perhaps unavoidable in the circumstances, though many hold the view that they might have been largely prevented by a wiser conduct of the process of development and by a more discerning selection of some of the chief personalities involved. Be that as it may, the course of the late war eventually brought home to all, except those fanatics who hold so firmly to their own pet theories and enthusiasms that they are impervious to the plain lessons of experience, that the three Services are all members of a team, each with its own part to play but none sufficient in itself to victory without the collaboration of the other two.

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* See *The Introduction of the Ironclad Warship*, by J. P. Baxter (Harvard University Press), and *The Rise of American Naval Power*, by H. and M. Sprout (Princetown University Press).

That being so, the existence of an Annual devoted to one Service alone, to the exclusion of the other two except by incidental references, has become an anachronism. "The Naval Annual" as it was when it was founded sixty-four years ago, "Brassey's Naval Annual" as it became after the death of the founder, and of his son who had taken over the editorship during the last few years of the founder's life, becomes "Brassey's Annual, the Armed Forces Yearbook"; and it will be devoted from now on to the interests of all three Services, which it will endeavour to serve with the same loyalty that it has hitherto given to those of the Navy. Its general character will be unchanged, and it will continue to survey material development year by year, while still placing chief emphasis on the more human side, on the problems involved in matters of strategy, policy, and administration. Above all, the keynote throughout will be emphasis on the essential unity of the three Services as members of the nation's defence team.

Unity, it should be understood, does *not* connote identity. It is no part of the policy of those who conduct "Brassey's Annual" to urge the amalgamation of the Services—far from it. Quite apart from the fact that specialization is everywhere found increasingly necessary in the conditions of today, the immense strength that is to be derived from tradition and *esprit de corps* depends on preserving the identity of the Services and of units within the Services. Moreover, to make oneself an efficient seaman, soldier, or airman is a whole-time job, not to be achieved in the spare time of learning two others. Co-operation and collaboration, not amalgamation; teamwork by masters of their own jobs, not fusion into a body of amateurs, is the secret of the successful conduct of war, which is the task for which it is the first and whole duty of the armed forces to fit themselves. The late war provided proof after proof of that great truth, as the next chapter demonstrates in detail.

This development in the purpose and make-up of "Brassey's Annual" involves a diminution of the volume of technical detail which has hitherto been included year by year. To retain the diagrams and tables of technical details of the world's warships without introducing corresponding sections devoted to the technical equipment of armies and air forces would be unbalanced; whereas to compile similar details for all fighting forces would either make the volume unwieldy in size—and cost—or would leave no space for the more human studies which it is the intention to make the chief feature of the Annual in its new guise. The diagrammatic and tabular section which has been a feature of past issues—which, as already noted, is available in greater profusion in other, more recently established, books of reference— will accordingly be discontinued. On the other hand, the "Reference Section" will continue to record year by year the Service Estimates, with the statements of policy which accompany them, and any other Government announcements especially concerned with Service matters and administration. That series will be unbroken; with the addition, from now on, of the records relating to Army and Air Force as well as the naval records as in the past.

The general scheme of the content of the Annual, with the exception of the omission announced above, will be unchanged. It will continue to comprise surveys of technical progress and of special technical development, since on them often depends tactical development and even, from time to time, strategical development as well. Technicalities, however, will not be the most predominant feature, and the greater part of the contents will be concerned with the higher aspects of the conduct of defence and of the operations of the Armed Forces. Politics have ever been banned from "Brassey's" pages, and that rule will continue in force; nor is it the intention of the editors to admit controversial criticism of the current administration, though they retain an entirely free hand regarding the contents and editorial policy. "Brassey" never has been and will not be in the future in any way officially inspired; but it has always been the intention to be helpful to the Services, and those in authority over them, rather than critical. If criticism of policy or administration is admitted, it has usually been accompanied by a statement of the other side of the question, in the interests of impartiality. The editors lay no claim to special authority or to qualifications for laying down the law on matters of Service policy or administration. Their chief aim is to provide reliable information on the matters included, and to conduct "Brassey" so as to make it, as remarked above, helpful rather than a hindrance to the Services in general, by providing the public with reliable information on defence matters and sound exposition of the principles of defence. Above all, they would propound the great principle of collaboration and team-work between the Services.

H. G. T.

CHAPTER II

TEAMWORK

"A country that is conquered must be controlled and administered ; a city that surrenders must be occupied. Battles can be won in the air or on the sea, and the mark of victory is this : that the patient infantry, military and civil, can then advance to organise peace.
(*Sir Walter Raleigh*, *"The War in the Air,"* 1914–18)

THIS PASSAGE, from Sir Walter Raleigh's standard *History of the War in the Air* of the 1914–18 war, reduces to a few brief but completely convincing words the whole doctrine of the paramount importance of teamwork by the Armed Forces of the Crown. I have had occasion to quote it before in contributions to earlier issues of "Brassey's Annual," but I cannot do better than take it as the text of a discourse upon that collaboration and co-operation which was brought to so high a pitch in the later stages of the Second World War, and at which all ranks of the Armed Forces must ever aim in the future if they are to provide the "sure shield" for their country in its hour of need.

In dealing with this subject it is necessary to preserve a sense of proportion. It is sometimes said, by a rather too facile a generalisation, that every operation of war is a "combined operation." That, however, will not stand the test of dispassionate analysis, for there are some operations of war in which the force engaged is drawn from one Service only, and in its conduct of the task in hand has no need to consider anything but its own needs of the moment. An example of this sort of operation is to be found in the action off the North Cape on December 26, 1943, when the German battleship Scharnhorst was sunk by the guns of the British battleship Duke of York and the torpedoes of the cruisers and destroyers which formed the remainder of the British force. The action took place 60 to 100 miles off the North Cape, in the wastes of the Arctic Ocean, where no armies or military operations could affect it in any way. It took place in the tempestuous twilight and darkness of the depths of an Arctic winter, in which no air forces could play a part. It was, it would seem, a purely naval operation, with no feature of the combined operation entering into consideration at all. And indeed, considered from the purely tactical aspect, that description holds good without possibility of refutation.

Yet considered from the wider point of view, it was far from being merely naval in its conception, effect, and influence. The British convoy which had proved the bait to tempt the Scharnhorst to sea was part of the essential line of communications running to the Russian armies in the field. It was carrying not only munitions and equipment of which those armies were in sore need, but aeroplanes and spare parts needed to keep the Russian Air Force in the air in support of the Russian armies. From the Allies' point of view, the battle in the twilight of the Arctic Ocean was a very real part of the campaign in which all three arms were fully engaged.

Nor can it be maintained that the British Army was unconcerned with the "far-distant, storm-beaten ships." It was at that time engaged in the hard-fought Italian campaign in mid-Italy, against German forces far stronger than it had been expected to encounter in that country. That they were not stronger still was due to the fact that the bulk of the available German armies were locked in contest with the Russians along the whole vast length of the Russian front. Unless the Russians could be sustained in their struggle, large forces of both German Army and *Luftwaffe* might be released from the Eastern Front to reinforce that in Italy. Actions at sea designed to maintain the supply line to northern Russia were thus a direct support to the British, American, and Allied ground and air forces fighting on the continent of Europe.

This incident may thus be cited in support of either side of the argument; but the conclusion is clear. From the point of view of planning and considered at the highest level, all operations form part of one great design, must be directed to the same end, and must take into account all the partners who will be engaged, each in his own sphere, in bringing the design to accomplishment. In the actual execution, however, it sometimes happens that not all the partners are engaged together in tactical contact.

In one respect, however, every operation is a "combined operation." It needs no special exposition to establish the proposition that, as Colonel Wyndham writes in Chapter X, the success of all operations at sea or on land is absolutely dependent upon superiority in the air—the single case of sea operations in the permanent night of winter in polar regions is almost the only exception to that rule. Yet a survey of the late war provides a surprising number of instances in which that almost self-evident truth would seem to have been ignored. The classic example is perhaps that of the battleships Prince of Wales and Repulse off the coast of Malaya in December 1941; but there was a parallel case nearly two years later in the Ægean, when severe casualties were suffered by both sea and land forces in the vain attempt to recover and hold the islands of the Dodecanese without adequate strength in the air. And an even more glaring example in the same area, in the early stages of the war, of course, was the disastrous campaign in Greece and the even more disastrous withdrawals first from the mainland of Greece and afterwards from Crete.

It can be argued that none of these incidents are really examples of mere neglect of military principles—that the action was forced on those responsible by political considerations in spite of the forces available being inadequate to the tasks undertaken. The air forces of strength required properly to support and collaborate with the British troops sent to Greece in the spring of 1941 simply did not exist, yet it was decided to be politically necessary to send troops to support Greece in her struggle against Italy, and take the risk of German forces of all arms coming to the rescue of Germany's Axis partner. The Prince of Wales and Repulse were intended to have been accompanied to the Far East by the aircraft carrier Indomitable, but owing to damage from grounding when entering Kingston Harbour, Jamaica, she was not available when the time arrived for them to be transferred to the East. Yet it was adjudged politically necessary for them to go, in the hope that their presence in Far Eastern waters, even without air support, might deter Japan from entering the war. In the Dodecanese it was hoped—on entirely inadequate grounds, as it proved—that the Italian garrisons, which largely outnumbered the German contingents, would not only ease to fight against the Allies in conformity with the capitulation of their Government, but would turn on their German *confrères* and actively assist British forces to overpower them and liberate the islands. Consequently the attempt to secure the islands was undertaken with the entirely inadequate forces which were all that were available in that theatre. How far these military gambles were justified by the value of the political advantages which it was hoped to reap from their success is a question on which it is perhaps yet too soon to hazard a judgment; but in any case I am not concerned with it here. I have cited these failures merely as instances in which defeat has resulted from inadequate collaboration between the different arms, due to failure to provide one or other in adequate strength; though it does not need such examples today to convince anyone of the truism that no operation by land or sea forces can be undertaken without provision for adequate collaboration in the air.

The converse is, perhaps, not always quite so obvious, which doubtless accounts for it too having been ignored on occasion in the course of the late war. In the early stages of the war, when immense industrial resources were being devoted to the production of bombers, and the major effort of the British bomber forces were being devoted to the bombing of marshalling yards at Hamm and such German towns and manufacturing centres as were then within operational reach, the connection between these operations and the campaign at sea was not immediately obvious; yet it was very close notwithstanding. All the fuel for the R.A.F. came from overseas, and the R.A.F. depended for its power to operate at all on the command of the North Atlantic being maintained, so that communications across it could be kept up without serious interruption. Yet at that time, and to an increasing degree up to the latter part of 1943, the U-boats held so much of an upper hand in the Atlantic that fuel resources were seriously imperilled; and the Navy's power to combat the U-boats was seriously hampered by lack of the necessary degree of collaboration in the air. The lack was not only of land-based aircraft—which were part of the R.A.F.—but also of ship-borne aircraft, needed in those stretches of the Atlantic passage which either could not be reached from the land at all or in which land-based aircraft could only remain to operate for so short a time that their employment was not a practicable proposition. And the lack was not only of ship-borne aircraft, but of the carriers to operate them.

The course of the war against the U-boats was made public month by month by the publication, simultaneously in this country and the United States, of a statement over the signatures of Mr. Churchill and Mr. Roosevelt—or, after the death of the latter, of Mr. Truman. In the final statement, issued after the German capitulation, the Prime Minister and the President remarked that "at the peak, in 1941 and 1942, the issue of the struggle hung in the balance." That it did so hang in the balance, and that we were so near defeat as we undoubtedly were at that stage of the war, we can now see was clearly due to a lack of full appreciation of the need for team-work between naval and air forces, and the consequent failure to provide the latter in adequate strength. It is true, of course, that the bombing of Germany was at that time the only method open to us of direct offensive against the chief enemy; and that as the R.A.F. was the only arm that then was capable of such an offensive, it was essential to devote to its equipment for that campaign resources as great as were available for it. But in this sphere it should have been a matter of first things first. Without assured communications with overseas, the power of the R.A.F. to conduct operations at all might well melt away, however lavish its equipment of aircraft, for lack of fuel supplies. If the necessity for teamwork in securing command of the seas had been better recognised at the outset we should never have reached the position of extreme peril described in the Joint Statement quoted above; and the return to the offensive would probably have become possible long before it actually did.

In the latter part of 1943 the position was restored, and it was the Allied sea and air forces operating in the Atlantic that regained the upper hand. Moreover, land forces had a hand in the campaign too—thus providing a parallel with that feature of the wars of the eighteenth century pointed out by Colonel Henderson, that both land and sea forces of the Crown collaborated first to secure command of the sea before passing to offensive campaigns designed to bring victory. Very early in the war it had been found necessary to secure the Faeröe Islands and Iceland, in the first place in order to deny them to Germany, who might have seized them by a *coup de main*. That entailed garrisoning them—not to hold down the inhabitants, but to guard against a German attack—and stationing air forces there, in the first place for their defence, but later also for operations at sea against U-boats. Later in the war the same action was taken in the Azores. These operations were, in the truest sense of the word, combined operations, though they were not made in the first place against the active opposition of the enemy. But they were operations of all arms, working in the closest collaboration.

I have cited above a number of incidents which illustrate the disastrous results that follow from neglect of the principle of teamwork, many of them from the course of the war in the Mediterranean theatre. The same theatre also provides a most striking example of the converse, in the course of the Allied landing in North Africa in November 1942 and the campaigns that followed it. Before that landing, the Army stood at bay before Alexandria, the Navy was unable to operate in the eastern or central Mediterranean in the face of an enemy holding nearly all the coastal airfields, and the Army and R.A.F. in the Middle East were dependent for their supply-line on the long sea route round the Cape. Malta was still holding out, though nearly at its last gasp, and was quite impossible as a sea or air base of operations, other than those in its own defence in the air. Six months later the position was completely reversed. The Mediterranean was open to Allied traffic from end to end, Malta was free and lavishly supplied; neither sea, surface or submarine, nor air forces of the Axis were able to show themselves outside the territory they still held in their own countries.

This had been achieved, of course, chiefly through the American reinforcements, which had become available in the Allied cause, collaborating with the British forces operating from Egypt. But the manner of its achievement was a standing example of teamwork between the three arms. The navies carried the armies from this country and America to their landing-places in French North Africa and provided the air protection needed on passage and during the landings, until air forces could be flown in to the airfields secured through the landing of the armies. Once based there, the air forces were able to collaborate with the naval forces in attack on U-boats and Axis air forces, so securing the passage of troop and supply ships; and to collaborate with the Armies in their further advance to secure the whole country. From the other end of the Mediterranean, once the Army began to advance from El Alamein, the Navy was able to carry forward a large proportion of its supplies by sea; and as the Allies secured more and more of the African terrain, the enemy's sea supply line was more and more completely cut off. By the time the German armies were penned into the peninsula of Cape Bon, Axis communications by sea were cut off altogether.

No one arm or Service alone could have achieved these resounding successes; not even all three arms could have achieved them unless they had co-operated wholeheartedly throughout, not only in the planning and preparation stages, but in the actual execution. It was a great object lesson in the results to be attained by collaboration which ruled the course of events in the rest of the war. Captain Liddell-Hart points out in Chapter V the immense influence on the armies' operations in Normandy of the air offensive against German communications, which entirely disrupted the German plans for concentration of forces needed to counter the expected Allied descent on the continent of Europe. Without that concentration of air attack on the targets indicated by the needs of the armies it would have been impossible to build up the Allied forces ashore in Europe to the strength necessary to deal with the German counter-attack, planned to be laid on when the decisive point should become apparent. Without the advance of the armies—the "patient infantry," as Sir Walter Raleigh called them—the victory in the battles of the air could not have been carried through into the total victory that was eventually achieved.

The operations at sea just before, during, and after D-day were examples of the same principle. The bulk of the operational U-boats were stationed in the French Atlantic ports, and it was essential to neutralise them while the great armada was crossing the Channel to its first landing, and thereafter while its communications included the Channel passage. Anti-U-boat operations, as pointed out above, called for a high degree of sea-air collaboration, since neither arm was effective without the help of the other. The surface ship, destroyer, or frigate was handicapped by difficulties of observation, since she could always be seen by the U-boat far outside the range at which the latter could be sighted from the ship; thus the U-boat could dive and often avoid location altogether, since asdic range was limited. At the same time, once in asdic touch, the ship could hunt the U-boat relentlessly. The aircraft could keep observation over a wide area, and could often attack the U-boat on the surface before she had time to dive. Even if the attack was not fatal to the U-boat —as it very often was—it forced her to dive and thus abandon her own attack on the intended prey; but once under water she was safe from her aerial attacker, who could neither follow nor attack her again. But the combination of ship and aircraft, skilled in such operations and practised in collaboration with one another, was irresistible. Before D-day both Coastal Command and the hunting flotillas made a special onslaught on the U-boats based in the Atlantic ports; and their operations were so effective that the great amphibious operation of the Normandy landing was completely unhampered by the arm of the German forces which, two years earlier, had come within a short space of achieving total victory.

The collaboration of which I have been writing was, and must be, a collaboration between experts, masters each of his own task. This entails specialisation in a very high degree; and indeed specialisation is a feature of the increasing complexity of the equipment, in all provinces, of the age. That is the reason why stress is laid on collaboration, rather than unification, of the Armed Forces. Even before the age of complex mechanical equipment a certain amount of specialisation was indispensable as between seamen and soldiers; for it needs a seaman, accustomed to the sea, to retain his powers and carry on duties afloat, whatever the weather, as any landsman who has ever been prostrated by sea-sickness will realise. Mechanisation is no antidote to the effects of sea-sickness, nor does the mere possession of mechanised equipment, in the shape of a craft or vehicle which, given calm and smooth water, any landsman can steer and handle as well as a seaman, teach a man how to make use of the forces of wind, tide and current, as he must if he is not to be overpowered by them when they are adverse. That is the art of seamanship, not to be learned without constant familiarity with the sea in all its moods, and not to be acquired in the spare time of becoming a skilled soldier or airman—also full-time jobs. Supply by sea is indispensable to the operations of soldiers and airmen; and consequently to secure command of the sea is an indispensable preliminary to the prosecution of such campaigns as alone can lead to victory—the "patient infantry" once more. So specialisation must stay, for command of the sea—which means the power to use it oneself as a highway and link between distant lands, not merely to deny that use to one's enemy—cannot be secured without seamen and ships, even though they nowadays need the tactical collaboration of other arms, weapons, and warriors to do their task completely.

The danger of specialisation is that it is intensely interesting, and tends to induce the specialist to lose sight of the fact that his task is only part of a great whole. That is why it would be as well, perhaps, if Sir Walter Raleigh's aphorism were more widely impressed on members of the Armed Forces than it is. While sailors naturally tend to concentrate chiefly on the task of securing and maintaining command of the sea—which is, indeed, a task which must at first be given priority—they should never forget that battles which are won at sea cannot in themselves bring victory until "the patient infantry" can play their paramount part. Airmen naturally tend to concentrate on and exult in their power of striking at the enemy's heart when they alone are capable of such a blow; but they too should not by that very laudable attitude be rendered forgetful of the dictum of their own historian. Specialisation is absorbing; but the enthusiasm of the specialist needs to be tempered by the realisation that he is one link in a chain, not the sole support of his nation's safety.

There is the less tendency to depart from the essential principles of collaboration during war, for then the day-to-day employment of a member of the Armed Forces keeps the practice of it ever before his attention. But in the past, inter-Service collaboration is one of the expensive things on which the need for peace-time economy has commonly imposed severe limitations. That has been the chief cause of the growth of "separatism" in the

Services during peace, for it is difficult to realise the need for collaboration with someone else when one never has occasion or even opportunity to practise it. On the other hand, if collaboration is the daily or constant rule, separatism has little chance to spread; and for that reason special measures to combat it have been recognised since the war as a necessity. These take the form of a number of inter-Service establishments, of which the joint Naval and R.A.F. Anti-Submarine School in Northern Ireland and the various schools of combined operations are those best known outside the Services themselves. There are also, for officers only, the Joint Staff College, and for more senior officers the Imperial Defence College, which provide special staff training for the officers who will later man the joint planning staffs of the Ministry of Defence, or the various Joint Services Missions in various stations, of which details are to be found in pages hereafter.

It is, indeed, in the domain of planning at a high level that the essential unity of the Armed Forces needs most steadily to be kept in mind. It is victory in possible wars for which the joint planners must provide the forces, and not victory alone but, as Captain Liddell-Hart argues in Chapter V, the object "of attaining a better post-war situation." It is not too much to say that that more comprehensive definition was not fully recognised by the High Command in the late war, as every student of international affairs must recognise today; we achieved victory, but few would assert that we have attained a post-war situation that is an improvement on that which existed before. For maritime Powers combined operations must ever be a weapon in their armoury, for by no other means can they exert their strength against an enemy; but it does not follow that amphibious assaults, such as those which were essential preliminaries to the Allied victory in the late war, will always be needed under that heading. A combined operation in the tactical sense, in the shape of amphibious invasions of hostile territory, may or may not be a necessity of a future war, if it should come. But planners in making provision for battles by sea or land must never again allow themselves to lose sight of the indispensable role of the "patient infantry." Teamwork must ever remain the governing feature of the role and functions of all the Armed Forces.

In conclusion, lest I should be accused of representing that this is something new, never realised until our own generation had to fight a world war to prove it, I quote below a few instances of the proofs of it that history affords. The first comes from the *Life of Sir John Leake*, that very eminent admiral who, though his name is hardly known outside students of naval history, was one whose record was, as his reputation should be, second to none in a long line of distinguished sea captains. In 1705 he commanded the fleet which relieved Gibraltar, then under attack from Spain, in the face of a French fleet of force superior to his own which was based at Cadiz, just outside the Strait. To quote from the Introduction to Volume LII of the Navy Records Society's series :

> "Leake found the garrison at their last gasp. Day by day the enemy had been demolishing the Rock's defences, and the Marines [*part of the garrison*], enfeebled by privation, were unequal to the task of repairing the breaches in the walls. The Admiral . . . short-handed as he was, made Hesse-Darmstadt [*the general in command of the fortress*] a present of 250 men, and

> every day sent ashore a working-party of 300 lusty tarpaulins to rebuild the fortifications. His carpenters remounted all the ordnance on the Rock, and while his armourers refashioned the muskets that were broken, his gunners supplied the garrison with firelocks from the ships."

The classic example of the intimate collaboration between the fleet commanded by Saunders and the army which, under the command of Wolfe, took Quebec and conquered Canada for England, needs no repetition. But there is a later example from the Western Hemisphere in the operations of the troops under General Grant, convoyed to the West Indies by the fleet under Admiral Barrington in 1778, and employed there, in collaboration with the fleet, in a series of operations against islands held by the French. Grant wrote a number of letters and despatches, of which I quote two from another Navy Records Society volume, No. LXXXI. To Barrington himself he wrote:

> "We give you a great deal of trouble and are infinitely obliged to you and the Fleet for the assistance you give us so cheerfully."

To the Secretary of State he wrote:

> "The Fleet and Army act with the greatest unanimity. 'Tis a pleasure to serve with Admiral Barrington, Commodore Hotham and the Gentlemen of the Navy in general."

Such is the pitch of teamwork at which the Services should ever aim. If it can be achieved—as it can, given the will on all sides to achieve it—no question of a unified command can arise as an indispensable condition of victory. If it cannot, equally no specific such as unified command can create the conditions necessary to victory. It is a principle that fighting men must keep ever in mind.

H. G. T.

CHAPTER III

THE SERVICES IN 1949–50

THE POLICY adopted by H.M. Government in the United Kingdom in regard to matters of defence and war planning is now closely linked with that of the Western Union Defence Organisation, which came into force in the autumn of 1948, and with the North Atlantic Treaty, which was signed in Washington on April 4, 1949.

The essence of the Treaty, of which fuller details are given in Chapter IV, is that it is a "collective effort for the preservation of peace and security." But Mr. Truman has put a realistic interpretation on this in saying "so long as the danger of aggression exists, it is necessary to think in terms of the forces required to prevent it." General Omar Bradley, U.S. Army Chief of Staff, was even more specific about the American outlook when he said that the North Atlantic Treaty "would enable the free nations of the Old World and the New to funnel the great strength of our New World to the ramparts of the Old, and thus challenge an enemy where he would transgress."

It is to this pattern for the defence of the free nations of the world that Britain is expected to contribute her full quota. Yet we have other obligations, widely dispersed and with their special requirements. Truly, the tasks which our Services must now be designed to fulfil are greater and more complex than ever before in time of peace. It is depressing and alarming, therefore, to realise how serious is the progressive cutting down of our fighting forces, and how ill-equipped they are to meet an emergency which may not be far distant: the Navy is becoming increasingly short of trained men and modern ships; the Regular Army is overweighted by and unduly preoccupied with the training of short-term national service youths; the Air Force is starved for skilled airmen and jet bombers.

The following figures in the Statement on Defence for 1950* speak for themselves.

"The main change in the use of our resources as between 1949–50 and 1950–51," says this Statement, "is that we shall have fewer men in the forces but shall spend more on equipment and research." The uniformed strength which it was previously planned to reduce to 750,000 by April 1, 1950, is now being brought down to 718,000 by that date, and 682,100 by April 1, 1951—more than 100,000 below the strength a year ago. Maintenance and training establishments, already severely pruned, are being further reduced. Headquarters staffs are being further cut. The process of economising has been greatly helped, it is asserted, by a comprehensive inter-Service review of the future development of the armed forces put in hand over a year ago in order to establish the rôles of the three Services in present circumstances. This review made it clear that there are no grounds for any substantial change in the relative roles or for any drastic curtailment of the strength of any one of the Services.

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* See page 293.

Details of the man-power allotted to each Service will be found under the sections in this chapter devoted respectively to the Navy, Army, and Air Force.

Dealing with the Defence budget for 1950–51, the total figure for the Admiralty, War Office, Air Ministry, Ministry of Supply, and Ministry of Defence is £780,820,000 for that year, as compared with £759,860,000 for 1949–50. This, with the reduction of man-power, will enable nearly £35,000,000 more to be spent on equipment and research.

MINISTRY OF DEFENCE

On the new Government taking office after the General Election, Mr. Emanuel Shinwell—former Secretary of State for War, became Minister of Defence in succession to Mr. A. V. Alexander, who had been raised to the peerage just before the resignation of the previous Government.

An important change of office took place in April 1949, when Air Marshal Sir William Elliot, K.B.E., C.B., D.F.C., succeeded Lieut-General Sir Leslie Hollis, K.B.E., C.B., R.M., as Chief Staff Officer to the Minister of Defence and as Deputy Secretary (Military) of the Cabinet. In May, General Hollis became Commandant-General, Royal Marines.

Air Chief Marshal Sir John Slessor, G.C.B., D.S.O., M.C., hitherto Commandant of the Imperial Defence College, relieved Marshal of the Royal Air Force Lord Tedder as Chief of the Air Staff on January 1, 1950. He had been succeeded on September 19 by Vice-Admiral Sir Charles S. Daniel, K.C.B., C.B.E., D.S.O., until lately Third Sea Lord and Controller of the Navy.

The 1949 Course at the College included eight Captains R.N., one Captain (E.) R.N.; six Brigadiers, one Colonel, and three Lieut.-Colonels; six Air Commodores and two Group Captains; eight Dominion officers; twelve Civil Servants; and two scientists.

COMBINED EXERCISES

A number of important exercises in which all three Services took part were held during 1949. The first of these was Exercise Trident at the Royal Naval College, Greenwich, during the latter half of April. The object of this was to study problems of the future with particular reference to the control of sea communications and the protection of seaborne supplies vital to the defence of the Empire and its ability to wage war. The programme was divided into three parts. The first was in the nature of an introduction in which features of the past were compared with those of the future, and an examination was made of the manner in which the Navy will have to perform tasks deriving from the envisaged strategy. The second part was devoted to showing how naval effort will be coordinated with that of the Army and Air Force in a series of typical operations. Finally there was an examination of scientific developments as they affect naval warfare, including the effects of atomic weapons. The strategic background to the wide range of subjects reviewed included a survey of the world distribution of raw materials, such as oil; shipping and its defence; future trends in warship design; the defence of convoys against air and submarine attacks of the future; and the tactical application of new weapons, such as jet aircraft and rockets.

The fourth of the post-war annual conferences and tactical studies for the Army at the Staff College, Camberley, was held by Field-Marshal Sir William Slim, Chief of the Imperial General Staff, from May 23 to 27. This was known as Exercise Britannia, and the object was to study the future organisation of Civil Defence in the United Kingdom with particular reference to the part to be played by the Army. Besides the Service participants, senior officials from the Civil Ministries took part. In a statement issued at the conclusion of the exercise, it was pointed out that the primary role of the Army at home is to build up and train formations for active service overseas and at the same time to be prepared to defend the United Kingdom. Consequently the part it could play in Civil Defence is limited, especially in the early stages of a war, when such Regular formations as are available will be urgently required overseas and the Territorial Army is in process of mobilisation. The bulk of the burden of Civil Defence will, therefore, have to be met by the Civil Defence organisations, including the Police and the Fire Services, and by the National Health Service. Nevertheless the opportune appearance on the scene of even a small body of well-trained and disciplined troops might prevent a serious local situation developing into a national disaster. It had therefore been decided that the Army must be prepared to provide mobile columns of roughly brigade strength ready to go to the help of the projected Civil Defence Organisation if required. The columns have been styled the third echelon of the Civil Defence Organisation. The first and second echelons will be the local Civil Defence Forces and the Regional Mobile Civil Defence Forces, which it is intended to raise.

In his summing up, the C.I.G.S. impressed on all Army officers present the necessity for holding a proper balance between the Army's primary role and its tasks in regard to Civil Defence and the great importance of the closest personal contact and effective liaison with the civil authorities at all levels.

An Air Defence exercise, known as Exercise Foil, took place between June 25 and July 3, in south-east England, East Anglia, and the Midlands. The object was to practice the various components of the Air Defences of Great Britain. American and Netherlands aircraft took part; also all available regiments, both Regular and Territorial, of the Anti-Aircraft Command in the area. Some 8,000 members of the Royal Observer Corps manned 19 R.O.C. operation rooms and 700 posts.

In a leading article on the results of the exercise, *The Times* of July 4, remarked that it was clear that "the country's defence system has improved since the previous exercise last September." The early-warning system by radar was able to detect the raiders in time to get the fighters up to intercept them; radar also enabled the fighters to be guided to their quarry. The fighters were able to climb to 30,000 feet and still intercept the attackers before they could reach their targets. Another sign of progress was the ability of the defending fighters to tackle low-level ground-attack machines. The same article, however, had some pointed criticisms of the material deficiencies shown up by the exercise. The R.A.F. had to use Vampires—withdrawn from Fighter Command—as make-believe jet bombers owing to the long delay in getting such aircraft into service. The U.S.A.F. and Russian air forces, it noted, both have this fast, new attacking type; but the first British jet bomber is still in prototype stage.

Another shortcoming was the lack of modern night fighters equipped with radar.

A series of interesting exercises, in which foreign officers and units participated, took place on the Continent, starting with one in the Soltan training area in western Germany between July 24 and 28. Troops taking part included a Danish Brigade Group, a Norwegian Brigade Group and an Armoured Car Squadron, and a British infantry battalion of the 7th Armoured Division. Neutral Signals were supplied by Headquarters B.A.O.R.

During the first week in October an exercise, known as "Agility 1" included the British 7th Armoured Division; 2 Group, Royal Air Force; and the 4th Belgian Brigade Group. This was a preliminary to "Agility 2," which took place in the Paderhorn area from October 9 to14. The forces taking part were the 2nd British Infantry Division; the 7th Armoured Brigade Group; 2 Group, R.A.F.; the 7th Belgian Brigade Group; and American, French, and Norwegian contingents. Two R.N. squadrons were included in the air forces. The exercise included a night withdrawal, the hasty occupation of a defensive position, counter attacks, and the launching of attacks and exploitation.

The object of "Agility 2" for the Army was to give commanders and staffs and all officers and other ranks experience of their rôle in a large formation under conditions similar to war. In the air, the object was to practice the control and operation of aircraft in interception missions, fighter ground-attack missions in support of land forces, light-bomber tactical missions in support of land forces, and reconnaissance missions. The need for ground and air forces to work as one, and for troops to realise the dangers from the air, were points on which particular stress was laid.

At the end of September the Amphibious School at Eastney, maintained by the Portsmouth Group of the Royal Marines, staged demonstrations of the methods of assault landings for the benefit of officers studying at the Army Staff College and others.

UNIFORM ALLOWANCES

Early in the year, it was announced that new rates of uniform allowance had been approved for officers of all three Services. The increases ranged up to 150 per cent. for some branches of the permanent Services; but the allowances for short service officers commissioned for less than two years have been reduced.

In announcing these changes the Minister of Defence, Mr. A. V. Alexander, said that as many articles as possible should be issued from Service stocks, without charge, in order to save public funds. A cash grant would be given to cover the reasonable cost of the remainder, including those articles which must be tailor-made if the requisite standard of smartness was to be maintained. Be this as it may, the fact remains that the standard of officers' uniforms has deteriorated lamentably of late years, especially in the Navy (see page 20).

THE NAVY

The effective strength of any navy must be gauged fundamentally by examining whether it has the number of ships of the types necessary to enable it to fulfil its tasks in peace as well as in war. It is interesting, therefore, to compare the composition of the Royal Navy just before two great wars, and four years after each of them, when war-time inflation has evaporated and economic pressure—which is their inevitable aftermath—has had time to make itself felt. The following table shows this:

	1914	1922	1939	1949
Battleships	59	22	12	5
Battle cruisers	9	7	3	Nil
Fleet carriers	Nil	4	7	6
Light fleet carriers	Nil			6
Escort carriers	Nil	Nil	Nil	1
Cruisers	110	54	60	26
Destroyers	218	200	163	113
Frigates and sloops	12	29	41	165
Submarines	76	89	54	64

Making full allowance for the change in the character of sea warfare and the fact that the aircraft carrier has to a great extent replaced the battleship as the capital ship, the run-down in the strength of the major ships of the Fleet from 33 (including the carriers) of 1922, to 17 (including the battleships) in 1949 is significant. But far more alarming is the reduction of cruiser strength. The cruiser is still the backbone of escorting forces in war and the indispensable "sea policeman" in peace. It used to be accepted that our cruiser requirements should be based on geographical considerations rather than on a comparison of numbers in foreign navies. Twenty-five years ago 50 cruisers was regarded as less than the safety strength; to-day we have barely half that number. It is axiomatic that in peace-time aircraft cannot replace warships when it comes to dealing with an emergency, and during recent years the calls for cruisers to protect British interests all over the world have shown no signs of diminishing, and it has only been with the greatest difficulty that the Admiralty have been able to meet them.

No less serious is the rapid fall in the curve of destroyer strength. We very nearly lost the two great wars because our anti-submarine resources were inadequate. To-day the submarine has become much faster and more elusive than ever before, and the destroyer is the only existing surface ship able to catch and kill it, yet we have far fewer now than we had immediately before the late war. It cannot be argued that the greatly increased number of frigates and sloops make up for this deficiency any more than it does for the lack of cruisers, although it is fair to admit that some forty of the former 'Hunt' class destroyers are now included in the frigate category. Except for the latter, these escort vessels, which did such good work against the U-boat, cannot be regarded as an effective antidote to the submarine of to-day.

The Statement of the Navy Estimates, 1950–51,* shows that in the Active Fleet, i.e. in full commission, there is only one major ship—the fleet carrier Implacable, flagship of the Home Fleet; in the second rank are 4 light fleet carriers and only 14 cruisers for world-wide requirements;

* See page 303.

34 destroyers, 27 frigates, 32 submarines, and 10 minesweepers compose the tail. All the battleships except the Vanguard have been relegated to the reserve; this solitary exception is a training ship, as are 2 fleet carriers, 1 light fleet carrier, 2 cruisers, 18 destroyers, 15 frigates, and 2 minesweepers. All the rest of the ships enumerated in the foregoing table are in various categories of reserve.

A very serious feature of this drastic reduction of the sea-going fleet is that naval officers and men are getting too little sea experience. This means that the former have too few opportunities for command and for handling ships, while the latter are becoming increasingly barrack-minded.

So much for the whittling away of the Navy in terms of ships in being; but an even worse symptom of our degeneration as a Sea Power is the continual reduction of man-power reflected in the reduced number of ships in full commission. The Statement of the Navy Estimates for 1949–50* mentioned that the vote for numbers provided for 153,000 in the Royal Navy and Royal Marines—a decrease of 14,300. In a statement to the newly elected Parliament in March 1950, the Minister of Defence said "to meet expenditure on essential modernisation of our existing fleet and other essential services it will . . . be necessary to find economies elsewhere and naval man-power will fall to 127,500 by April 1951." These reductions are to be mainly in man-power ashore and in base establishments, but the fact remains that the sea-going Fleet is little more than a skeleton of its pre-war strength.

BOARD OF ADMIRALTY

There were a number of changes among the Sea Lords during 1949. In May, Vice-Admiral M. M. Denny became Third Sea Lord and Controller in succession to Vice-Admiral Sir Charles S. Daniel. In November Vice-Admiral Sir George E. Creasy succeeded Vice-Admiral Sir John H. Edelsten as Vice-Chief of the Naval Staff; he was succeeded as Fifth Sea Lord and Deputy Chief of the Naval Staff (Air) by Rear-Admiral M. J. Mansergh.

In October it was announced that the King had approved the appointment of Vice-Admiral the Earl of Mountbatten of Burma to be Fourth Sea Lord and Chief of Supplies and Transport in succession to Vice-Admiral H. A. Packer to take effect in June 1950.

The Admiralty Board Room, which was shattered by blast during an air raid in the early hours of April 17, 1941, has been restored. The elaborate carvings, panelling, furnishings, and pictures were mutilated, but the restoration has been carried out in a manner which preserves the atmosphere of the original setting and only minor concessions have been made to modernity.

FLAG CHANGES

The King approved the promotion to Admiral of the Fleet of Sir Algernon Willis, Commander-in-Chief, Portsmouth, in the vacancy caused by the death of Admiral of the Fleet Sir James F. Somerville, and to date March 20, 1949.

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* See page 315.

It was announced in the autumn that Admiral Sir Philip L. Vian would relieve Admiral Sir Rhoderick R. McGrigor in January 1950, and that the latter would succeed Admiral Sir Robert L. Burnett in the following March. Rear-Admiral R. V. Symonds-Tayler succeeded Admiral Sir William G. Tennant as Commander-in-Chief, America and West Indies, in April 1949.

The Lord Chancellor informed the House of Lords that the King had given permission to Vice-Admiral Sir Geoffrey Blake to retire from the appointment of Gentleman Usher of the Black Rod when Parliament reassembled after the 1948–49 Christmas adjournment. He paid a special tribute to Admiral Blake's services in that office.

The Navy lost two very distinguished Flag Officers by the deaths, during the year, of Admiral of the Fleet Sir James Somerville and Vice-Admiral Sir Thomas Troubridge. Admiral Somerville had the distinction of being restored to the Active List during the war after having been retired for ill-health in 1939. His exceptionally valuable services in high commands indicated how insufficient were the grounds for that retirement. He died on March 19, 1949.

Admiral Troubridge had a most distinguished career in command of aircraft carriers, and with the landings in North Africa, Sicily, Italy, and Southern France, and after the war as Fifth Sea Lord (Air); Admiral (Air) at Lee-on-Solent. He was flying his flag as Flag Officer (Air) and Second-in-Command, Mediterranean when he had to relinquish that appointment owing to ill health. He died on September 29, 1949.

PERSONNEL

An important change in the status of the Air Branch of the Navy was made when, as from April 5, it was absorbed into other existing branches, and the "A" was abolished from the curl of uniform stripes of officers. Former Air Branch officers, with the exception of Air Engineer Officers, were absorbed in the Executive Branch in their substantive rank and seniority. The Air Engineer Officers were transferred to the Engineering Branch and now wear the distinguishing purple cloth of that Branch.

Ratings are no longer entered for flying duties in aircraft of the Royal Navy. Air crews for naval aircraft are provided by officer pilots and observers. These officers are now drawn from the following sources: (*a*) permanent officers who volunteer for specialisation in flying duties, and (*b*) short-service commissioned officers entered for flying duties for a period of eight years full-time service followed by seven years' service on the Emergency List. The short-service officers are entered in the Executive Branch of the Navy. A certain number, towards the end of their period of service, are to be offered permanent Commissions.

With a view to supplementing the reserve pool of specialists in naval aviation, and as a temporary measure, a scheme was announced by the Admiralty in August whereby a limited number of national service men will be trained as pilots and observers. The first batch will be limited to ten—seven pilots and three observers—selected from volunteers. During their air training they are Midshipmen R.N.V.R., and after a year and a half full-time training they will be required to continue part-time training as permanent members of that service.

OFFICERS' UNIFORM

An Admiralty order of March 31, 1950, decreed that full dress, cocked hat, frock coat, and epaulettes would no longer be worn by naval officers, even if they possessed them. The only day uniform would be the monkey jacket.

The King had approved the alternative wearing on this uniform of orders, decorations, and medals, or some of them, as appropriate.

For evening wear mess undress and a modified form of mess dress are retained. The latter includes a white waistcoat, miniatures and stars, but not the former gold-lace trousers. Neither of these uniforms are obligatory for short-service officers.

RECRUITING

In his Statement of the Navy Estimates 1949–50,* the First Lord, referring to recruiting, said it had been reasonably good, but wastage had been high and numbers had not increased as rapidly as had been hoped owing to re-engagements being below pre-war level.

The Statement on Defence for 1950 said that a decline is foreseen during 1950–51 in the number of men serving on Regular engagements in the Navy, resulting from a deliberate restriction of intakes to the level necessary to maintain the approved strength. The intake of national servicemen will be reduced to 2,000.

RE-ENGAGEMENTS

The Admiralty admitted, in the First Lord's explanatory memorandum, that "there is still reluctance among men reaching the end of their 12-year engagements to re-engage . . . with the result that the Navy is feeling the shortage of experienced men." This is officially attributed mainly to the prevailing full employment in civil life. Nevertheless, "special measures calculated to attract a higher proportion of men to re-engage are . . . being examined."

ROYAL NAVAL RESERVE

After a period of some uncertainty about what was to be the future of the R.N.R., it was made known in June that the Admiralty had decided to reconstitute the General Service Section. The importance of not impairing the efficiency of the Merchant Navy in war had been borne in mind, and Royal Naval Reservists would not be withdrawn from that Service in an emergency except with the concurrence of the Ministry of Transport, which on its part had undertaken to release them to the Royal Navy as soon as possible.

The reconstitution of the Patrol Service Section R.N.R. has also been arranged with the fishing industry. This section is required for service in minesweeping and anti-submarine trawlers and other small craft.

It is the intention of the Admiralty to build up the General Service Section of the R.N.R. to 1,400 officers and 2,000 ratings; and the Patrol Service Section to 600 officers and 2,000 ratings.

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* See page 311.

ROYAL NAVAL DEFENCE SCHOOL

The Damage Control and Fire-Fighting Training Schools, established at Stamshaw, near Portsmouth, have been amalgamated with the Chemical Warfare Training Establishment into the Royal Naval Defence School. The combined School was commissioned as H.M.S. Phœnix on September 1, 1949.

PRIZE MONEY

It was announced on June 1 that applications could be made for R.N. prize-money, campaign stars, and medals. Forms could be obtained at Post Offices, but would not be used by serving personnel for whom other arrangements had been made. Conditions of awards were published in "Brassey's Naval Annual" 1949, page 206. The unit share had been increased from the £4 originally announced to £4 4*s*.

EXPLOITS OF H.M. SHIPS AMETHYST AND CONSORT ON THE YANGTZE

By the end of 1948 the Chinese Communist Army had reached the line of the Yangtze and during the early months of 1949 they were preparing for the spring offensive. About April 6, they broadcast their intention of crossing the river and taking Nanking by April 15. At this time H.M. destroyer Consort of 1,700 tons, carrying four 4·5-in. and a number of smaller guns, was acting as British guardship off that city. She had been up river for three weeks and was running short of provisions, and was due to be relieved. By April 16, the Communist "D" day had still not materialised, and after communicating with H.B.M. Ambassador in Nanking, the Flag Officer Second-in-Command, Far East Station, gave orders that H.M. Sloop Amethyst, of 1,400 tons and carrying six 4-in. and a number of smaller guns, was to go there as soon as possible. Just as she was leaving Shanghai, a message was received from Nanking that it was practically certain that the Communists' crossing would take place on April 21.

The Consort was preparing to sail when, at 10 a.m. on April 20, a signal was received from the Amethyst—"Am aground under heavy fire," and giving her position near Rose Island, some 90 miles below Nanking. The Consort speeded her departure and steamed down river at high speed. On sighting the Amethyst, she prepared to take her in tow, but came under a hot fire from the Communist artillery. She returned the fire and destroyed the guns in sight, but the enemy brought up more and more semi-automatic guns which could not be detected and the Consort sustained serious damage and a number of casualties. It was clear that she could not help the Amethyst and might soon be put out of action; so reluctantly she continued her passage to Shanghai, fighting her way down river in daylight and steering by hand from the tiller flat because her forward position was destroyed when the wheelhouse was hit and the coxswain killed. Her casualties were 10 killed and 30 wounded, the latter including her captain—Commander I. G. Robertson, D.S.O., D.S.C., R.N., who nevertheless piloted and fought his ship until he had brought her safely to Shanghai.

On April 21, the Amethyst succeeded in refloating herself and moved to a more sheltered position, two miles above Rose Island. Her captain, Lieutenant-Commander B. M. Skinner, R.N., was severely wounded and soon afterwards succumbed to his injuries; her First Lieutenant was wounded and her doctor killed. Some sixty of her crew were landed. They were shelled and machine-gunned while getting ashore, but a large proportion succeeded in making their way to Shanghai.

The cruiser London, flying the flag of the Flag Officer Second-in-Command of the Station, had arrived at Shanghai, and on the morning of April 21, stood up river with the sloop Black Swan in company to go to the aid of the Amethyst, but met with such heavy fire, causing casualties, that it was obvious that there was no chance of freeing her without serious loss of life in all ships. They therefore returned to Shanghai.

Meanwhile, Lieutenant-Commander J. S. Kerans, who was Assistant Naval Attaché at Nanking, had made his way onboard the Amethyst and assumed command. On July 30, after dark, she slipped her cable and steamed down river. She was fired on heavily by the Communists' shore field and machine guns while turning to head down stream and for a quarter of an hour while passing the Kiangyin forts, but after a hazardous passage and thanks to the brilliant piloting of her captain in the dark she rejoined the fleet at Woosung.

This exploit was something of a counter to the "face" which the Chinese Communists had acquired by their successful duel with the British Navy—as they saw it, after the centuries of it being regarded throughout China as invincible.

The King sent the following message to the C.-in-C. Far East Station:

> Please convey to the commanding officer and ship's company of H.M.S. Amethyst my hearty congratulations on their daring exploit to rejoin the Fleet. The courage, skill, and determination shown by all on board have my highest commendation. Splice the mainbrace.
>
> George R.

Lieutenant-Commander Kerans received the immediate award of the D.S.O.

On the return of the Amethyst to Plymouth in November, she was welcomed by members of the Board of Admiralty. On November 16, officers and men from H.M. Ships Amethyst, Consort, and London, and the aircrew of the flying-boat which had taken a R.A.F. medical officer and supplies to the marooned ship, attended a Service of Thanksgiving at St. Martins-in-the-Fields, and afterwards marched to the Guildhall, where they were entertained to luncheon by the Lord Mayor of London.

On the next day, the officers and men paraded before the King at Buckingham Palace, where His Majesty addressed them and afterwards bestowed fourteen decorations.

MATERIAL

New construction continues to lag. The 36,800-ton fleet aircraft carrier Eagle, building by Messrs. Harland and Wolff (Belfast), will not be completed until 1951. Her sister ship, the Ark Royal, which Cammell Laird are building, was launched by the Queen on May 3, 1950. It is reported that Australia is to acquire a second carrier "when the Majestic is completed," but there has been no suggestion of a date.

The Daring—a second and the name ship of the new 2,620-ton class of destroyers—was launched at Messrs. Swan Hunters' yard at Walsend-on-Tyne, on August 10, 1949. It has been stated that it is the intention of the Admiralty that in due course all anti-submarine vessels shall be able to hunt the new fast type of submarine; new frigates are to be built and existing vessels converted. The contract for the machinery of the first of these new anti-submarine frigates has been placed and the order for the ship is to be given during 1950. Consideration is also being given to the introduction of frigates of a simpler design, cheaper and easier to build in large numbers.

It has also been stated officially that many other ways of dealing with the new submarine menace are being tried. Among these is a new type of homing torpedo. Another development is a "single-packet" anti-submarine aircraft (GR17), so called because it is equipped for both detection and destruction. The prototype has already undergone successful deck-launching trials.

A number of submarines are being converted to fast battery drive. This enables speed to be boosted up for a limited time while attacking and escaping. These converted under-water craft are to be used for anti-submarine exercises.

All this leaves a strong impression that our measures to meet the new and greatly improved submarine, which there are good reasons to believe Russia is building in large numbers, are only in an early experimental stage. Meanwhile it has been admitted that the Admiralty do not regard the current fleet of frigates and escorts as competent to deal with the new fast submarines if they should appear in large numbers—altogether a very unsatisfactory state of affairs.

In the field of naval aviation there is also a regrettable lag in new equipment. At the time of the introduction of the Navy Estimates for 1950–51, in March 1950, no carriers had been rearmed with jet aircraft, although a flight of Vampires had worked from H.M.S. Implacable during the previous autumn exercises. It is proposed to bring in a new attacker aircraft of the single-jet type with a maximum speed approaching 600 miles an hour. The light aircraft carrier Warrior has been fitted experimentally with a flexible landing surface on which aircraft may land without the need of the conventional undercarriage. Lieutenant-Commander E. M. Brown was awarded the Boyd Trophy (a silver model of a Swordfish aircraft presented by the Fairey Aviation Company) for his skill and enterprise during these deck-landing experiments in which he landed a Vampire with skids on this flexible deck.

The advent of the gas turbine as a practical prime mover, with the potential advantages of low maintenance, compactness, and light weight, in addition to those of self-contained operation and quick starting, has led the Admiralty to investigate its development for warships. A contract has been placed with Messrs. W. H. Allen, Sons and Co., of Bedford, for a 1,000-kW. gas turbine and generator. It is expected that trial running of the prototype engine will begin early in 1951.

SINKING OF H.M. SUBMARINE TRUCULENT

A tragic affair was the sinking of the submarine Truculent in the Thames Estuary after a collision with the Swedish merchant ship Divina in the evening of January 12, 1950.

The submarine was on the surface returning to Chatham after trials, when the lights of the Divina were sighted fine on the port bow. It appeared from the evidence given at the subsequent court martial that the commanding officer, Lieutenant C. F. Bowers, R.N., was confused by the Swedish ship carrying a second red light which, it transpired, she was doing to comply with a local order affecting ships with explosive or inflammable cargoes. It was not appreciated how close were the two vessels when the course of the Truculent was altered to cross the Divinas' bows. The submarine was hit and badly holed in her starboard bow and sank in eleven fathoms within a minute. Fourteen survivors were picked up, but 48 of the crew and 16 civilian dockyard workers lost their lives. A considerable number of men were able to surface through the escape hatches, but were swept away by the strong tide in the darkness before they could be rescued.

A subsequent court-martial found Lieutenant Bowers not guilty of "negligently or by default losing his ship," but that the alternative charge of "negligently or by default hazarding his ship" was proved. He was sentenced to be severely reprimanded.

SINKING OF THE OLD IMPLACABLE

The sole remaining representative of the enemy's fleet and only ship still afloat of all those which fought at Trafalgar was sunk with due honours nine and a half miles south-east of the Owers Light on December 2, 1949. As the Duguay Trouin she was sixth ship from the van of the Franco-Spanish line and is reputed to have fired long-range shots at the Victory as she sailed past; although she was so delayed in getting into close action that she played no very distinguished part in the battle. She with three other French line-of-battle ships under Admiral Dumanoir fought a spirited action against a squadron under Rear-Admiral Sir Richard Strachan ten days later. They were all captured; the Duguay Trouin was taken to Plymouth and renamed H.M.S. Implacable.

In 1925 Admiral Beatty appealed for funds to save her from being scrapped so that she might be used as a holiday ship for young people. This was done and she was taken to Portsmouth and used for that purpose until the war, when she was taken over again by the Admiralty for harbour service. Due to neglect during the war and increasing old age, she was found to be beyond repair and was condemned to her sea grave.

The sinking was witnessed by the Commander-in-Chief, Portsmouth, Admiral of the Fleet Sir Algernon Willis, and Rear-Admiral M. J. Adam, French Naval Attaché. A naval guard was paraded and Royal Marine buglers sounded the "Last Post."

THE ARMY

In the Statement on Defence* presented to Parliament on March 6, 1950, it was forecast that the numbers in the Army by April 1 would be

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* See page 293.

15,000 below the estimate in the Statement for the previous year. A further reduction of 20,000 would be made by April 1, 1951, when the strength will be 356,600. In the main, the reduction will be in headquarters, maintenance, and training establishments.

It was pointed out that the Army is still called upon to fulfil wide commitments all over the world, and to some extent therefore the provision of the most modern equipment for future use must yield to the urgent present need for trained man-power.

The size of the Territorial Army will increase rapidly after mid-1950, when the inflow of national service men begins. When fully developed it will consist of anti-aircraft artillery units, a field force, home defence units, and administrative units designed to provide backing for both the Regular and Territorial Armies in war.

In a review of recruiting, this statement records that it is the Government's aim to reach a position where we can rely far more on Regular personnel to discharge our peace-time defence commitments. The primary object of national service—which will still be necessary in default of some major change in the international outlook—would then be the production of trained reserves. It is added that in order to carry out this aim "we need to recruit on a scale never before attempted in a time of peace and full employment." This seems to denote a trend towards rebuilding a well-trained, long-service voluntary Regular Army, at any rate for service abroad—a policy which has been advocated for some time by those who criticise the existing system on the grounds that efficiency is sacrificed and time is wasted in creating a half-trained, national-service man-power army instead of a highly trained, mechanised, and mobile force. There can be no question that the efforts of the present relatively small number of Regular officers and N.C.Os. have to be concentrated mainly on instructing and administrating the ever-changing flow of national service men. The crux of the recruiting problem, as things stand, is to secure enough long-service volunteers for this, let alone to create a self-contained Regular force. Unfortunately the prospects of recruiting even the authorised numbers of Regulars do not seem to be bright, for this White Paper on Defence* states that a decline is seen during 1950–51 in the number of men serving on Regular engagements, and a heavy wastage arising from the termination of current engagements; yet Regular recruiting during the year will probably not wholly offset this wastage. A fall of 7,000 in the numbers of men serving on Regular engagements is expected. The figures for recruiting for 1949 and 1948 show that the Army had fallen considerably short of what was required.

The Statement remarks that a high level of recruitment cannot be expected unless service conditions compete in attractiveness with those in civilian life, and quotes figures to show how much is being done to provide new and better accommodation for the soldier, including more married quarters. What does not seem to be appreciated by the authorities is that prestige is more important to recruiting even than pampering with bed-side lamps, free pyjamas, and curtained cubicles, and that must spring from the soldier's pride in himself, his officers, and his regiment. The swamping of the Army by national service men, who regard it as, at best, a tedious interruption to life instead of a career, the steady lowering of the status of officers, and the lack of incentives to pride in tradition formerly provided by a smart uniform and the regimental spirit are all tending to make the Army less and less attractive as a long-term service. The Regular, first-line soldier should be regarded as belonging to a *corps d'elite*, with the pay, prospects, and national recognition appropriate to it.

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* See page 293.

ARMY COUNCIL

In the new Parliament, assembled in March 1950, Mr. Strachey replaced Mr. Shinwell as Secretary of State for War.

On January 4, 1949, General Sir William J. Slim, Chief of the Imperial General Staff, was promoted to Field-Marshal.

Major-General N. C. D. Brownjohn succeeded Lieut.-General Sir Gerald W. R. Templer as Vice-Chief of the Imperial General Staff in February 1950.

Lieut.-General J. F. M. Whiteley succeeded Lieut.-General Sir Kenneth N. Crawford as Deputy Chief of the Imperial General Staff in September 1949.

Other important appointments to the War Office were:

Major-General E. O. Herbert as Director, Territorial Army and Cadets (January 1949).

Major-General J. D. Woodall as Vice Adjutant-General (April 1949).

Major-General M. S. Chilton as Vice Quarter-Master-General (February 1950).

Major-General K. G. McLean as Military Secretary to The Secretary of State for War (November 1949).

COMMANDS

Appointments to the principal commands have been as follows:

Germany.—Major-General G. K. Bourne as Commander, British Troops, Berlin (January 1949).

Egypt.—Lieut.-General G. W. E. J. Erskine as G.O.C. British Troops, Egypt and Mediterranean Command (January 1949).

Far East Land Forces.—Lieut.-General Sir John Harding as Commander-in-Chief (July 1949).

Northern Ireland District.—Lieut.-General Sir Reginald T. S. Denning as G.O.C. (July 1949).

Southern Command.—Lieut.-General O. L. Roberts as G.O.C.-in-C. (July 1949).

Hong Kong.—Lieut.-General Sir E. C. Robert Mansergh as C.-in-C. British Forces (October 1949).

Malta.—Major-General G. W. E. Heath as G.O.C. Troops (November 1949).

London District.—Major-General J. A. Gascoigne as G.O.C. (early 1950).

Eastern Command.—Lieut.-General Sir Gerald W. R. Templer as G.O.C.-in-C. (February 1950).

HIGH COMMISSIONER FOR GERMANY

In September 1949 the control of the British sector of Germany was vested in a British High Commissioner. General Sir Brian H. Robertson, who since 1947 had been Commander-in-Chief and Military Governor, Control Commission for Germany, was appointed to that office.

HOME COMMAND BOUNDARIES

In order to align the boundaries of Army Home Commands as closely as possible with the boundaries of Civil Defence administrative regions, certain changes in the former were made, to take effect on April 1, 1949.

The following transfers were made:

(*a*) Cumberland and Westmorland from Western to Northern Command.
(*b*) Warwickshire from Northern to Western Command.
(*c*) Buckinghamshire from Eastern to Southern Command.
(*d*) Northamptonshire from Eastern to Northern Command.
(*e*) The High Peak District of Derbyshire from Northern to Western Command.

From the same date London District was transferred to Eastern Command; but the G.O.C. London District retains his responsibilities in regard to the Household Cavalry, The Brigade of Guards, and the King's Troop, Royal Horse Artillery. In these matters he continues to act as an independent commander under the War Office.

REGULAR COMMISSIONS

Two new schemes for obtaining Regular Commissions in the Army were announced by the War Office at the end of 1949. One enables the young officer who holds a national service or short-service commission and wishes to make the Army his career to enter the Royal Military College, Sandhurst. Previously he was disqualified for Sandhurst because he already held a Commission. Now, if he is 19½ or over, he is eligible on the same terms as a Regular soldier or national service man still serving in the ranks.

The other scheme enables a graduate who has entered a university at a normal age to be granted a permanent Commission in the Regular Army with the same seniority as if he had entered the Royal Military Academy, Sandhurst, at the youngest permissible age. The amount of seniority granted will vary with the class of degree and the subject in which it is obtained. It is not apparent how this scheme provides training, if any, in the duties and bearing of an officer before the undergraduate receives a Commission.

RESERVES OF OFFICERS

The War Office announced early in 1949 that the lists of the Army Reserves of Officers were being revised, and that officers and ex-officers in the following classes were invited to join either the Regular Army Reserve of Officers or the Army Officers Emergency Reserve:

(*a*) Regular ex-officers who resigned with less than 10 years' service.
(*b*) Released Emergency Commissioned officers.
(*c*) Ex-officers who have relinquished short service commissions since the end of the war.
(*d*) Retired and released officers formerly of the Indian Army, whether they held Regular or Emergency Commissions.

It was suggested that officers with the time to spare should join the Territorial Army, but those who could not do so were urged to apply to join one of the Reserves.

NEW TERMS FOR REGULAR ENGAGEMENTS

New terms for Regular engagements by other ranks were announced by the War Office on September 24. In addition to those now obtaining, which are 5 years with the Colours and 7 years with the Reserve, or 12 years with the Colours, there are two new types:

(*a*) *All Regular Volunteers.*

Seven years with the Colours and five years with the Royal Army Reserve.

(*b*) *National Service Men only.*

Three years with the Colours and nine years with the Royal Army Reserve, open to:

(i) serving national service men who have completed 6 months' full-time service;
(ii) men who have completed their full-time national service, provided they enlist within 6 months of their discharge from such service.

(*c*) *Conversion.*

A man enlisted on any Regular engagement may convert to another engagement with longer Colour service, at any time after he has completed one year's service as a Regular soldier.

The new Regular engagements have been introduced with the general object of widening the field of Regular recruiting. They also enable certain high-grade Army tradesmen while serving to qualify for trade union recognition in trades requiring a minimum of five years in the trade.

QUEEN ALEXANDRA'S ROYAL ARMY NURSING CORPS

Queen Alexandra's Royal Army Nursing Corps became a Corps of the Regular Army as from February 1, 1949. The change involves alteration in the legal status of the Regular officers of the Q.A.I.M.N.S., who will become liable to the full provisions of the Army Act in common with male officers.

Pending the building up of the Army Nursing Service on its peace-time establishment, a short-service commission scheme has been introduced in the Q.A.R.A.N.C. as an interim measure. Selected candidates will serve for 2, 3, or 4 years, after the satisfactory completion of which a gratuity at the rate of £50 for each full year's service will be granted. During this time they may be considered for Regular commissions.

WOMEN'S ROYAL ARMY CORPS

A Royal Warrant, issued on February 1, 1949, constituted the Women's Royal Army Corps as part of the Regular Army. With minor exceptions and modifications, the officers and other ranks are subject to the Army Act and King's Regulations to the same extent as male members of the Army.

As from that date A.T.S. units were converted into W.R.A.C. units. Women officers are now granted commissions in the Land Forces and women other ranks are enlisted in the same way as soldiers of the Regular Army.

Officers and other ranks of the A.T.S. are not compelled to join the new Corps and may, if they wish or if not acceptable for transfer, serve on their existing conditions to complete their current engagements.

The age-limits for non-serving applicants to join the W.R.A.C. are 18 to 30, but exceptions can be made in the case of ex-service women. The normal initial engagement is for 4 years with the Colours. This can be extended for a further 4 years and a quota of women will be permitted to complete 12 years. Members of the W.R.A.C. may complete 22 years' service and qualify for a pension. Details of pay, pensions, and gratuities were published in the White Paper issued on December 15, 1948.

On the same day as the Royal Warrant constituting the W.R.A.C. was issued, it was announced that the King had been pleased to give orders for the following appointments in that Corps:

H.M. The Queen as Commandant-in-Chief.
H.R.H. The Princess Royal as Controller Commandant.
H.R.H. The Princess Elizabeth as honorary Senior Controller.

WOMEN OFFICERS' RANKS

The Chief of the Imperial General Staff, Field-Marshal Sir William Slim, announced at the annual reunion of Q.M.A.A.C. and A.T.S. Comrades Association on March 18, 1950, that Army titles are to be given to W.R.A.C. officers. The new ranks (with those previously held) are as follows: Second Lieutenant (Second Subaltern); Lieutenant (Subaltern); Captain (Junior Commander); Major (Senior Commander); Lieut.-Colonel (Chief Commander); Colonel (Controller); Brigadier (Senior Controller); Major-General (Chief Controller).

H.R.H. The Princess Royal, formerly Chief Controller, will now be a Major-General, and Dame Mary Tyrwhitt—formerly Senior Controller and Director W.R.A.C., will be a Brigadier.

This change will also apply to the Queen Alexandra's Imperial Military Nursing Service, the Territorial Army Nursing Service, and their reserves serving on full pay. A Principal Matron will now be a Lieut.-Colonel.

THE TERRITORIAL ARMY

The Memorandum on Army Estimates for 1950–51* refers to the new phase in the development of the Territorial Army which will begin in July 1950, when the first national service men with an obligation to serve in it will enter. The first annual camp for these men will not be constituted until 1951; but in readiness for their arrival a detailed examination of the Order of Battle for the Territorial Army is being made.

The strength of the Territorial Army on December 31, 1949, is given as 82,533, as compared with 67,210 on the corresponding date of the previous year. In 1949, 150 additional T.A. centres were provided; arrangements are being made for the further number which will ultimately be required.

The Territorial Army now includes a pool of technical staff officers and technical intelligence staff officers. Released officers with wartime experience of such duties can obtain T.A. General List commissions in their old rank. They do 15 days' training a year with Regular units or appropriate establishments, during which time they receive full pay and allowances.

A Territorial amphibious unit—No. 102 Amphibious Column of the R.A.S.C., has its headquarters at Slatterbridge Camp in the Wirral. Annual camp training was carried out in July 1949 on the Morfa at Harlech, beside the Royal St David's golf course.

The first Territorial unit in Army history to hold a training camp in a foreign country was the 7th Battalion, Argyll and Sutherland Highlanders. They spent 14 days at Duisberg, Germany, in July with the 1st Battalion Black Watch in recognition of their recruiting and training record.

On April 23, 1949—St. George's Day—the Lord Mayor reviewed an impressive parade representing all Territorial Army units supported by the City of London, with their Cadet units.

There is now a Women's Royal Army Corps (T.A.), and a scheme is in force to provide permanent staffs for the units. Women who have served in the A.T.S. for at least one year and been released, are eligible to apply. The age limits are 25 to 40 and enlistment is in the rank of private, but with rank previously held regranted if a vacancy exists. Normally, women accepted serve only in the area of their choice; but in the event of the W.R.A.C. (T.A.) being embodied, they will have a world-wide General Service liability.

ARMY CADET FORCE

A tribute is paid in the Memorandum on the Army Estimates 1950–51 to the great value to the military forces of the Cadet Forces.

The strength of the Army Cadet Force on July 31, 1949, was approximately 7,000 officers and 76,000 cadets. Some 14·5 per cent. of all officer cadets in training for commissions in the Regular Army, or as national service officers, are ex-members of the Army Cadet Force.

There were over 650 entries for the National Rifle Association annual cadets' weekend meeting held at Bisley on October 1 and 2. The Inter-Cadet Challenge Cup was won by the Army Cadet Force, the Air Training Corps being second.

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* See page 316.

FULL DRESS FOR THE GUARDS

A welcome return to pre-war conditions was instituted by the King's permission for the Brigade of Guards to wear full dress from June 1, 1949, when they perform guard and other public duties.

When the ceremony of Trooping the Colour in honour of the King's official birthday took place on June 9, all ranks of the Household Brigade, Horse and Foot, taking part wore full dress for the first time since 1939. His Majesty took the salute and Princess Elizabeth was present in uniform and on horseback, with the Duke of Gloucester.

PRESENTATIONS OF COLOURS

The 1st Battalion, Welsh Guards, received new Colours from the hands of the King in the garden of Buckingham Palace on May 25.

On July 27, the King presented new Colours to the 1st Battalion, Irish Guards, at Buckingham Palace.

SOUTH AFRICAN WAR JUBILEE

To commemorate the outbreak of the South African War fifty years ago, some 2,000 veterans gathered in London on July 16 and 17. On the second day, Australians, Canadians, South Africans, New Zealanders, and Tasmanians joined members of the South African War Veteran's Association in a parade and march in the City, and a service in St. Paul's Cathedral. Field Marshal Lord Wavell, Mr. Churchill, the Earl of Athlone, and the Lord Mayor of London—all of whom served in South Africa—were among those present.

THE AIR FORCE

In the Statement on Defence, 1950, it was mentioned that the number of men in the Air Force on April 1 would be 202,400—about 10,000 below the planned figure. During 1950–51 only a small increase was foreseen in the number of men serving on Regular engagements. There would be a heavy wastage due to the termination of current engagements. Regular recruiting was expected to produce an increase of 3,000.

The figures given for 1948 and 1949 show that recruiting for the Air Force during those years had fallen considerably short of what was required.

The Air Estimates, supplementing these figures, stated that the uniform strength of the Force would fall to about 198,000 by the end of 1950–51—a decrease in two years of 12 per cent. Yet, it is asserted, the fighting strength of the Force shows a rising curve and the expansion of the front-line announced in March last is being continued in 1950–51. This, it is explained, is being achieved partly by economy and improved efficiency in the use of man-power, and partly by closing or reducing in size some units and formations less essential than front-line combat strength. The transport force in the U.K. has been reduced; the Central Bomber Establishment has been abolished and its duties allocated to bomber squadrons; and reductions are being made in the Technical Training and Maintenance Commands.

These and other measures, it is stated, have enabled the necessary man-power to be found to complete the doubling of the jet-fighter strength of Fighter Command and to make a considerable increase in the striking power of Bomber Command. Nevertheless the impression left is that this result has been, or is being, achieved by the old, unsatisfactory method known as "robbing Peter to pay Paul," and it is admitted that there are serious deficiencies in some of the most important and highly skilled trades.

AIDES-DE-CAMP TO THE KING

Changes in the R.A.F. Establishment of Aides-de-Camp to the King were announced on April 26, 1949. Previously there were one Principal Air A.D.C., two Air A.D.Cs. (paid), and eight additional Air A.D.Cs. The title of Principal Air A.D.C. and the two paid posts have been abolished. In future there will be two Air A.D.Cs., twelve A.D.Cs., and one Honorary A.D.C. Provision is now made only for expenses.

Air Chief Marshal Sir John Slessor, formerly Principal Air A.D.C., and Air Chief Marshal the Hon. Sir Ralph Cochrane were appointed as the two new Air A.D.Cs.

AIR COUNCIL

As a result of the increased work arising from the North Atlantic and Brussels Treaties, an overhaul of the organisation of the Air Ministry with a view to economising in man-power, and the training problem created by the introduction of advanced types of aircraft, a reorganisation of the Air Staff took effect as from March 1, 1950.

This Staff is now divided into two main groups. One, under a new Vice-Chief of Air Staff, Air Chief Marshal the Hon. Sir Ralph Cochrane, is responsible for matters affecting strength and fighting efficiency. The other, under a new Deputy Chief of Air Staff, Air Marshal Sir Arthur Sanders, is responsible for inter-Service policy and planning, and for co-operation with the Commonwealth and Allied air forces. Both officers are Members of the Air Council, and directly responsible to the Chief of the Air Staff, Air Chief Marshal Sir John Slessor.

Air Marshal Sir Leslie N. Hollinghurst succeeded Air Marshal Sir Hugh W. L. Saunders as Member for Personnel on the Air Council, on October 31, 1949.

Air Marshal Sir William F. Dickson succeeded Air Chief Marshal Sir George C. Pirie as Member for Supply and Organisation on the Air Council, in March 1950.

APPOINTMENTS

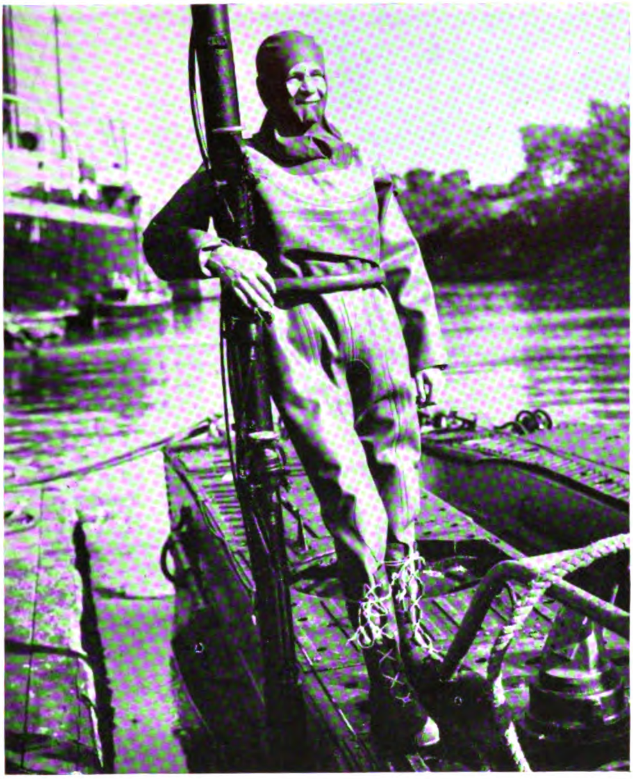
The more important changes in Air Officers' appointments included the following:

Inspector-General of the Royal Air Force, Air Marshal Sir Hugh W. L. Saunders (October 31, 1949).

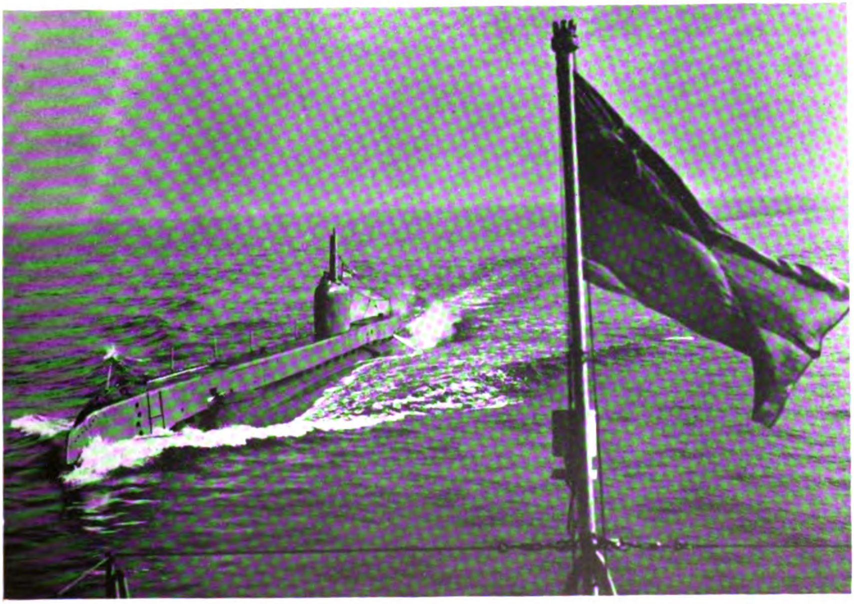
A.O.C.-in-C. Maintenance Command, Air Vice-Marshal T. A. Warne Browne, with acting rank of Air Marshal (October 15, 1949).

A.O.C.-in-C. Coastal Command, Air Vice-Marshal C. R. Steele, with acting rank of Air Marshal (January 1950).

A.O.C.-in-C. Bomber Command, Air Marshal Sir Hugh P. Lloyd (February 1950).

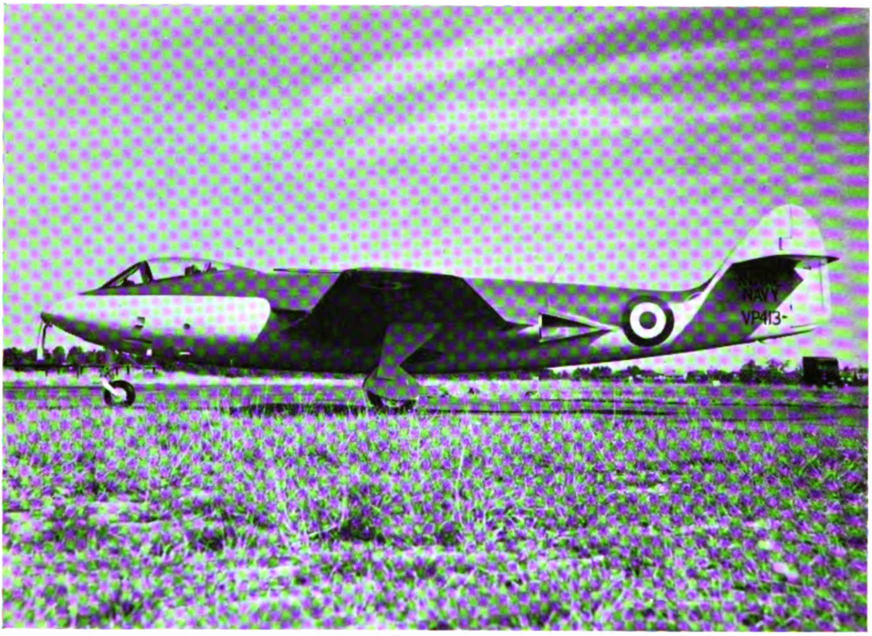


Foul-weather Suit for Midget Submarines

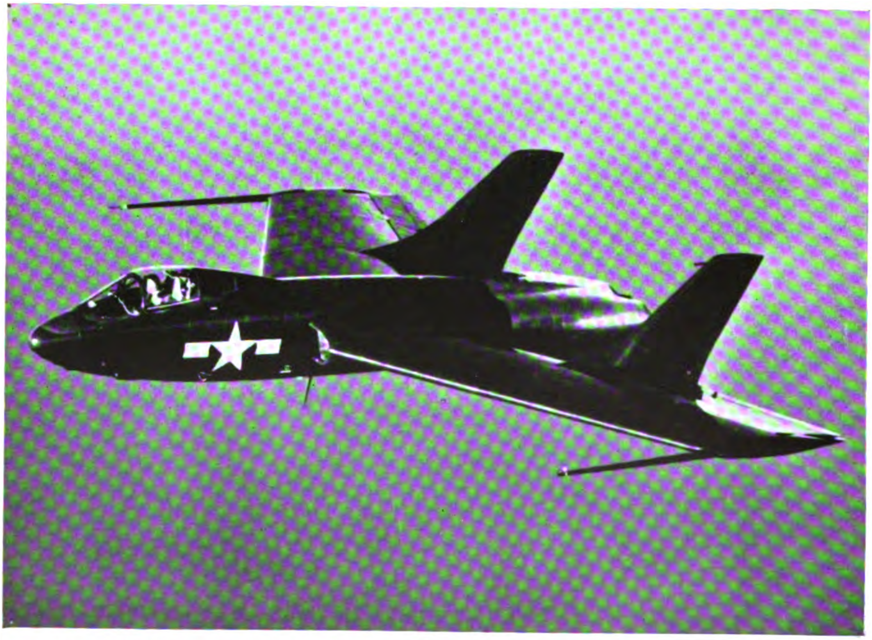


A Stream-lined Submarine H.M.S. Seraph

Central Press photographs



British Naval Aircraft. Hawker Sea Hawk



American Naval Aircraft. Chance Vought XF7U-1

C.-in-C. Middle East Air Force, Air Marshal Sir John Baker (February 1950).

C.-in-C. Far East Air Force, Air Vice-Marshal F. J. Fogarty, with acting rank of Air Marshal (November 1949).

A.O.C.-in-C. Flying Training Command, Air Marshal Sir Hugh S. P. Walmsley (March 1, 1950).

A.O.C.-in-C. Transport Command, Air Marshal Sir Aubrey B. Ellwood (March 31, 1950).

Air Vice-Marshal G. E. Gibbs was appointed Chairman of the U.K. Delegation to the Military Staff Committee, United Nations Organisation, New York, as from October 29, 1949.

Air Chief Marshal Sir George C. Pirie was appointed Head of the Air Force Staff, British Joint Services Mission to the U.S.A. in March 1950.

MATERIAL

The Memorandum on the Air Estimates states that the re-equipment and expansion of day-fighter squadrons is continuing. A new jet fighter, known as the 'Venom' and superior to the existing 'Vampire,' is to be adopted. The new jet bomber, 'Canberra,' has been ordered in quantity, and deliveries should begin during 1950. 'Hastings' and 'Valettas' are replacing the 'Yorks' and 'Dakotas' in the transport squadrons. The production programme includes a substantial number of jet aircraft for use in Western Union defence.

The striking power of Bomber Command is being increased by the formation of new squadrons equipped with B29 aircraft supplied under the Mutual Defence Assistance Programme.

The radar system of the United Kingdom is to be materially strengthened.

A new crew trainer, the Vickers 'Varsity' T.1, is now in service. This is designed to facilitate the instruction in one aircraft of navigator/bomb-aimers, pilots, and signallers. For pilot-training side-by-side dual controls are provided. Positions for the navigator and signaller are included in the pilot's flight deck. Prone positions for the air-bombing instructor, his pupil, and practice bombs, are contained in the underslung "pannier" between the flight deck and the spar.

In order to simplify the work of the pilot, all new aircraft designed for the R.A.F. are to have cockpit knobs of standardised and distinctive shapes. For example, all flap-control knobs will be uniform-sized spheres with small cylindrical projections each side; the supercharger control will be a ¾-inch cube; and the mixture control will be a disc with small pyramids on the rim. Emergency controls, such as those for working ejection seats or fire extinguishers, will have diagonal yellow and black stripes to make them more conspicuous. One effect of the system, it is expected, will be to reduce the risk of accidents due to the pilot moving the wrong knob.

Mention was made in the Statement on the Air Estimates of the development of an air-to-air guided missile designed to improve the effectiveness of fighters against the modern bomber. This may be on the lines of the experimental American "Firebird" or the later "Mighty Mouse," some details of which have been made public. The former is a rocket-propelled guided missile, about 7½ feet long after it has shed its booster rocket. The missile is aimed initially by the mother aircraft, but "homes in" on the target, and when within effective range the warhead automatically explodes. The "Mighty Mouse" has been developed by the U.S. Department of Defence for naval aircraft. This aircraft rocket is said to be faster and to have greater range than any used in the late war, yet small enough to be carried in quantity. It will be possible to fire them singly or in salvoes from launchers under the wings or fuselage.

AIRFIELD CLASSIFICATION

A new system of classifying airfields according to the length and strength of their runways has been introduced. Formerly they were classified by the general description of the types of aircraft for which they were thought to be suitable, e.g. "heavy bomber." In future, a four-figured number will be used, the first two figures representing the length of the runway in hundreds of feet, and the second two the load which the surface can support when applied in the form of a single wheel, in thousands of pounds. Thus a runway classified as "60/50" has a length of 6,000 ft. and can support a load of 50,000 lb.

PERSONNEL

A new officer branch in the R.A.F. is the Fighter Control branch. This will supply the organisation for alerting and co-ordinating the defences of the country and be responsible for controlling fighter aircraft. It calls for skill and technical knowledge which can only be acquired by full-time employment in connection with these duties. Permanent commissions will be available in this branch to members of the R.A.F. and W.R.A.F., also commissions to young men during their period of national service. The branch also offers the chance of permanent commissions to pilots and navigators on short-service commissions, to other aircrew and to airmen who are fighter plotters and radar operators. Airwomen in those two trades may be granted five-year commissions with the chance of a permanent commission. A limited number of airwomen may be appointed direct to permanent commissions.

A further 50 commissions in the Secretarial branch and 54 in the R.A.F. Regiment were offered during the latter part of 1949. These were in addition to the 570 commissions a year open to airmen for the period of their national service in the Equipment, Secretarial, and Education branches and the R.A.F. Regiment.

Another branch requiring more officers was Air Traffic Control. Released R.A.F. officers below the age of 45, and willing to serve in the U.K. or in R.A.F. Commands overseas, were invited to apply.

Staff College courses, which had been of 9 months' duration, were increased to 12 months as from January 1950 at Bracknell, and from May 1950 at Andover.

Three R.A.F. Empire Schools—those of Flying, Air Navigation, and Air Armament—were amalgamated to form the R.A.F. Flying College at Manby, Lincolnshire, which opened in January 1950. The new College provided selected officers with practical instruction and experience in a combined course of flying, navigation, and the use of weapons in all conditions. The "Empire" outlook of the three schools, which have pooled their knowledge and resources to form the new College, will be retained by Commonwealth representation on the instructing staff and on the course.

An all-jet training establishment, No. 203 Advanced Flying School of R.A.F. Flying Training Command, now specialises in teaching young officers and airmen who are to become the pilots of these aircraft in Fighter Command. Before going to this Advanced School, pupils will have completed 200 hours' flying training at a flying training school. When they arrive they are given dual instruction on the 'Meteor' 7, and then fly the single-seater 'Meteor' 4 or the 'Vampire.' They are trained to fly at 600 m.p.h. and to climb at a rate of 5,000 ft. a minute.

The first batch of cadets to complete the full course at the R.A.F. College, Cranwell, since the 1939–45 war passed out on April 8, 1949. The course lasted two years and eight months, instead of the two years before the war—an indication of the growing complexity of aircraft and flying.

The recruited strength of the University Air Squadrons is approaching its authorised maximum of 960.

The annual medical inspection of all R.A.F. officers, suspended during the war, was reintroduced in May 1949.

WOMEN'S ROYAL AIR FORCE

The appointment was announced of Group Officer Nancy M. Salmon as Director of the W.R.A.F. in succession to Air Commandant Dame Felicity Hanbury, to take effect from July 1, 1950. Two new commissioning schemes were introduced in the W.R.A.F. at the end of 1949, the first for women with professional qualifications and experience, the other for women of good general education but without career training. Under Scheme I women with a university degree or equivalent professional qualification are eligible for commissioning in the Technical branch, and women who have passed the intermediate professional qualification may be commissioned in the Equipment and Secretarial branches. Both these categories undergo training as officers. Under Scheme II the candidate is enlisted as an airwoman, does her professional and officer training as a cadet, and is commissioned on successfully completing this training. The scheme applies to the Equipment and Secretarial branches.

Under both schemes commissions will be initially for 5 years' active service and 4 years in the reserve. These W.R.A.F. officers may apply for an extension to 10 years' short service. Throughout their short service they may be recommended for permanent commissions.

A new head-dress for W.R.A.F. officers was introduced early in 1950. This is a beret of blue-grey woollen material, similar to that worn by R.A.F. officers. It has a gilt eagle and crown badge, and may be worn with working dress of serge battledress blouse and skirt.

RESERVE FORCES

The King has been pleased to approve a badge for the R.A.F. Reserve Command. This depicts an Ionic pillar enfiled by an astral crown; the motto is the one word "support."

An Air Advisory Committee of Territorial and Auxiliary Forces Associations has been set up to act as a liaison body between the Council of those Associations and the Air Ministry, particularly on questions affecting the Air Auxiliary and Reserve Forces. The first meeting of the new Committee was held on January 19, 1950; it is composed of members representing both sides. The Chairman is Air Marshal Sir Leslie Hollinghurst, and the A.O.C.-in-C., Reserve Command—Air Marshal R. M. Foster—is the other Air Ministry representative.

Twenty fighter squadrons of the R.Aux.A.F. were transferred to Fighter Command as from November 1, 1949. Since their reconstitution in 1946, the squadrons have been under the control of Reserve Command for both training and administration. But it was considered that they had reached a sufficiently high standard of training to be transferred to the Command which would control them in war, and the main administrative problems which attended the re-formation of the squadrons have been resolved. In future Fighter Command will be responsible for training, operations, and administration. Reserve Command will remain responsible for recruiting, conditions of service, and all dealings with the Territorial and Auxiliary Forces Associations. The squadrons remain at their same airfields, and existing local associations and links with cities and counties are not affected.

The Air Ministry announced on August 2, 1949, that the Queen had graciously accepted the appointment of Honorary Air Commodore of No. 600 (City of London) Squadron, R.Aux.A.F., and No. 2600 (City of London) Light Anti-Aircraft Squadron, R.Aux.A.F. Regiment. Her Majesty paid her first visit to No. 600 Squadron at Biggin Hill on October 29.

No. 500 (County of Kent) Squadron R.Aux.A.F. has the distinction of being the first squadron in that Force to be equipped with jet aircraft—Gloster 'Meteor' 3s, and two Mark 7 two-seaters.

AUXILIARY AIR OBSERVATION POST FORCE

An important step in providing for the special air needs of the Army was taken during 1949, when a new branch, organised by Reserve Command, was formed to supply Observation Post units whose main task will be to fly and observe on behalf of artillery. These units are composed of both Army and Air Force personnel and equipment. The aircraft are piloted by Territorial Army pilots and serviced and maintained by the R.Aux.A.F. The force is part of the latter Service and under R.A.F. control, but its tactical use is the responsibility of the Army. Ground crews are recruited from suitably qualified ex-Service men or those with comparable experience; pilots are recruited from ex-Air Observation Post Pilots or suitable volunteers from Royal Artillery T.A. units.

This new formation consists of five squadron headquarters, each with a R.Aux.A.F. Mobile servicing section attached, located respectively in the Northern, Southern, Eastern, Western, and Scottish reserve areas, and a total of 20 flights each operating Auster aircraft.

ROYAL OBSERVER CORPS

The King assumed the position of Air Commodore-in-Chief of the Royal Observer Corps on April 11, 1950. This coincides with the celebration of the Corps' silver jubilee. The prefix "Royal" was conferred in 1941, in recognition of its valuable services during the Battle of Britain.

A Royal Observer Corps Medal was instituted by Royal Warrant on January 31, 1950. It is awarded to members with 12 years satisfactory service.

Some 3,000 members of the Corps took part in an exercise on August 14, 1949, over the Corps' Midland area, ranging from Durham in the north to Bury St. Edmunds in the south and Derby in the west. Eleven R.O.C. operations rooms and 450 posts were manned.

On October 9 all observer posts west of the Pennines between Manchester and Carlisle were manned by men and women of the Corps in the first exercise held under war-time conditions since the end of the late war.

The lower age for new volunteers for the Corps is now 16, and the upper age 45 for service at the Centres and 55 for service at posts.

AIR EXERCISES

Besides Exercise Foil, already referred to, a number of other air exercises were carried out during the past year. One of the most important was Exercise Bulldog, designed primarily to give Bomber Command experience in day and night attacks of defended targets. Adverse weather over the whole country led to the first action being postponed, but the exercise eventually started at 1 p.m. on September 24 and continued until dawn on September 27.

The attacking forces consisted of 'Lincoln,' 'Lancaster,' and 'Mosquito' squadrons of Bomber Command, 'Mosquito' squadrons of the British Air Forces of Occupation in Germany, and B.29 and B.30 Groups of the U.S.A.F. Third Air Division under Major-General Leon W. Johnson. 'Hornets' were drawn from Fighter Command to operate with the attackers, and 'Meteors' to represent high-speed jet bombers.

Defending forces, commanded by Air Marshal Sir Basil E. Embry, A.O.C.-in-C. Fighter Command, comprised squadrons of the R.Aux.A.F., French, Netherlands, and Belgian Air Forces, in addition to Regular fighter units. Regular and Territorial Regiments of the Anti-Aircraft Command, under General Sir G. Ivor Thomas, took part.

The exercise, as a whole, was under the general direction of Air-Marshal Sir Aubrey Ellwood, A.O.C.-in-C., Bomber Command. It enabled new ideas to be tested, including the use of fighter escorts for 'Meteor'-bombers, the "liquidating" of all commanding officers within one Group, and the manning of a complete sector by the R.Aux.A.F.

What was described as the biggest R.A.F. tactical air display to be held in Germany was staged by B.A.F.O. at the R.A.F. Station, Gutersloh, Westphalia, on August 16, 1949. It was attended by Chiefs of Staff from Britain, the United States, and Western European countries.

THE BERLIN AIR LIFT

The origin of the Berlin Air Lift was the deliberate attempt by the Soviet Government to force the Western occupying Powers to withdraw from Berlin, when in June 1948 they instituted a blockade of the western sectors of that city which would threaten it with starvation and destitution.

In order to counter this formidable move in the "cold war," Britain and the United States forthwith organised the air transport of food and other essentials. This developed into a major operation which became known as the Berlin Air Lift or Operation Plainfare. This, combined with certain other measures, successfully defeated the Russian plot, and in May 1949 the blockade was formally lifted, although it was some little time before all obstruction to road and rail traffic ceased, and it was not until August that the number of aircraft employed could be materially reduced.

Final figures for the "Plainfare" year showed that of a total load of 1,952,660 short tons flown into Berlin, the R.A.F. and Commonwealth squadrons carried 334,227 tons.

On September 23, the last R.A.F. Transport Dakota operating for "Plainfare" landed at Gatow. The American operation, known as "Vittles," ended on October 1. A ceremony, attended by Marshal of the Royal Air Force Lord Trenchard, in Berlin on September 23, marked the closing stages of what constituted a bloodless but none the less important victory for the Western Powers against Russian aggression.

E. ALTHAM

CHAPTER IV

THE ATLANTIC TREATY AND WESTERN DEFENCE

IT MAY happen in the course of a country ramble that we find ourselves walking alongside a fence in a field where sheep are grazing. We shall then observe that, when the sheep become conscious of our presence, they raise their heads and gaze at us in doubt for some moments. Then with one accord they flock together into a dense mass in the centre of the field and continue to gaze at us. After a time, emboldened by the sense of security afforded by the fulfilment of their gregarious instinct, they may perhaps advance towards us.

Maybe in the adjoining field on the other side of the fence other sheep are grazing. But, thanks to the feeling of security afforded by the intervening fence, they will ignore our presence and continue peacefully grazing. Perhaps we are armed with a gun, which we propose to shoot over the fence with the intent to destroy some of the sheep in the further field; but the sheep will be oblivious to this threat and will continue to put their trust in the fence as a source of security.

A moment's thought will suffice to lead to the conclusion that this parable of the sheep is a remarkably true illustration of the reactions of nations to the problem of collective security. Those who see themselves directly threatened are usually very ready to come together and form a united front against the danger; those who are only indirectly threatened too often bury their heads in the sand; while those not threatened at all praise God for their luck. The League of Nations ignored this human characteristic. It assumed, without any warrant, that, if the sheep in one field were threatened, all the other sheep in the parish would flock to their assistance. The period between the two world wars saw several demonstrations of the fallacy of this idea; the lesson has been learnt, and the United Nations Charter recognises that, if collective security is to be really effective, it must be built up on a regional basis.

Even when considered from the regional point of view the outlook of any nation towards collective security may change completely in the course of a very few years. For example, British security has always been based on the three principles of (1) command of the sea, (2) no one Power to dominate Europe, (3) independence of the Low Countries. The methods by which we have sought to maintain these principles have, however, frequently varied. In the year 1901 it was suggested that we might join the Triple Alliance of Germany, Austria-Hungary, and Italy. The Prime Minister, Lord Salisbury, rejected the idea in the following words:

> Count Hatzfeldt* speaks of our "isolation" as constituting a serious danger to us. *Have we ever felt that danger practically?* If we had succumbed in the Revolutionary War, our fall would not have been due to our isolation. We had many Allies, but they would not have saved us if the French Emperor had been able to command the Channel. Except during his reign we have

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* German Ambassador in London.

> never been in any danger; and therefore it is impossible for us to judge whether the "isolation" under which we are supposed to suffer does or does not contain in it any elements of peril. It would hardly be wise to incur novel and most onerous obligations in order to guard against *a danger in whose existence we have no historical reason for believing*. . . .*

There was no obvious threat to our three principles and therefore no need for collective security. Within four years the aggressive policy of Germany and the expansion of the German Navy had produced a threat, and we concluded the Entente Cordiale with France, subsequently expanded into the Triple Entente by the inclusion of Russia.

We know from bitter experience that security can be greatly strengthened by foresight and sound planning in advance. This is another reason why collective security needs to be built up on a regional basis. In any system the planning staff must consist of personnel from all the nations concerned. Therefore, if the aim is to produce a world-wide system of security, staff officers will from time to time find themselves engaged in preparing plans for an attack on their own nation, a ridiculous situation. In a regional system this cannot occur because the planning will be directed against a specific threat and the threatening Power will not form part of the alliance. The League of Nations, faced by the absurdity of staff officers being called upon to prepare plans for an attack on their own country, avoided the dilemma by indulging in no planning at all.

The Communist *coup d'etat* in Czechoslovakia provided the danger signal which caused the sheep in the field of Western Europe to flock together for mutual protection. On March 17, 1948, the Treaty of Brussels was signed by representatives of Belgium, France, Luxembourg, the Netherlands, and the United Kingdom of Great Britain and Northern Ireland. The ten articles of the Treaty are briefly summarised below:

Article I. Provides for coordination of economic activities.

Article II. Aims at the promotion of a higher standard of living for the peoples of the High Contracting Parties.

Article III. Pledges the High Contracting Parties to endeavour to lead their peoples towards a better understanding of the principles which form the basis of their common civilisation.

Article IV. If any of the High Contracting Parties are attacked, the others will afford all military and other assistance in accordance with the provisions of Article 51 of the United Nations Charter.

Article V. All such measures shall at once be reported to the Security Council and shall end when the latter has taken the necessary steps to maintain or restore international peace and security. This Article in no way affects obligations under the United Nations Charter.

Article VI. The High Contracting Parties pledge themselves never to enter into commitments in conflict with the Treaty.

Article VII. Creates a Consultative Council to meet whenever necessary to consider any situation which may constitute a threat to peace.

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* *British Documents on the Origins of the War*, 1898–1914. Gooch & Temperly, Vol. II, No. 86, page 68.

Article VIII. Provides for the submission of disputes to the International Court of Justice at The Hague.

Article IX. Throws the Treaty open to other States to join.

Article X. Provides for ratification.

The terms of the Treaty give rise to several reflections. In the first place it has a sound geographical basis in that it represents a drawing together for mutual support of all the nations who must, from their geographical position, bear the first brunt of an aggression from the East. If the principle of mutual cooperation in defence problems is thus established at the most obvious danger-spot, it can readily and realistically be expanded as circumstances may dictate. As we shall see, this process has already begun.

Secondly, Article IV brings the Treaty into line with the United Nations Charter.

Thirdly, under Article VII it provides for sound planning on a realistic basis:

(*a*) To strengthen, co-ordinate, and integrate the military and supply effort of each country.

(*b*) To study the strategic and tactical problems of the defence of Western Europe.

(*c*) To provide a command organisation to meet any emergency.

The supreme authority under the Treaty organisation rests with the Consultative Council, consisting of the Foreign Ministers of the five Powers. It meets when necessary, but at least every three months, successively in the five capitals. It is advised by the Permanent Commission, which is established in London and composed of the heads of the four diplomatic missions in London and a British representative of ambassadorial rank. It is provided with a Secretariat-General organised on an international basis, which meets once a week and co-ordinates and directs the activities of the various committees which deal with all problems.

Chief of these committees is the Western Union Defence Committee, consisting of the five Ministers of Defence, which has the same arrangements for meeting as the Consultative Council. It is served by the Western Union Chiefs-of-Staff Committee and the Western Union Military Supply Board. The former is served by the Permanent Military Committee, a standing body located in London and responsible for arranging the meetings of and preparing all documents for consideration by the Chiefs-of-Staff Committee. On the same level as the Permanent Military Committee is the Principal Administrative Planning Committee, which deals with all administrative problems in connection with raising and maintaining forces, mobilisation, and operational plans for Western Union Defence. It meets as and when required and has one high-level administrative representative from each of the five Powers.

The Permanent Military Committee is in its turn served by sub-committees which may be grouped under three headings:

(*a*) Each of the three Services is represented by an Advisory Committee composed of permanent members representing their respective Departments. These committees deal with the standardisation of equipment and methods in the Forces of the Five Powers.

(*b*) Inter-Service Committees to deal with policy of an inter-service nature.

(*c*) Planning Divisions to examine problems and co-ordinate planning done by national and international bodies.

The Western Union Military Supply Board is directly under the Defence Ministers on a level with the Chiefs-of-Staff Committee. It advises on the production of equipment and supplies, makes recommendations as to how military requirements can be met and deals with the implementation of production programmes. The Board consists of a representative of high standing from each country and is served by a Supply Executive Committee which corresponds to the Military Committee and works in close consultation with it.

Next to be considered is the command organisation. This consists of a Commanders-in-Chief Committee, presided over by Field-Marshal Viscount Montgomery of Alamein, charged with the study of the tactical and technical problems of the Defence of Western Europe, and responsible to the Chiefs of Staff Committee. The members of this committee are General de Lattre de Tassigny as C.-in-C. Land Forces, Air Chief Marshal Sir James Robb as C.-in-C. Air Forces and Vice-Admiral Jaujard as Flag Officer, Western Europe. These officers exercise no executive command in peacetime, but would assume command of such forces as might be allocated to them in the event of war.

The position of the Flag Officer, Western Europe, differs from that of the other Commanders-in-Chief designate because the sea communications of Western Europe cannot be isolated from the North Atlantic communications, or indeed from the main sea highways of the world. The sea cannot be divided into watertight compartments. His functions are therefore advisory and to act as a link with the naval authorities dealing with the war at sea. He would presumably exercise executive command as far as the local defence of French territorial waters is concerned.

From this brief outline of the organisation established under the Treaty of Brussels various reflections arise:

(1) The whole framework is designed to promote at all levels the integration of equipment, organisation, and doctrine.

(2) The Commanders-in-Chief designate have been selected logically. They are presided over by the soldier with the best fighting record of the last war. The command of the land forces is in the hands of a Frenchman because the geographical position of France inescapably dictates that the French Army must be the keystone of the land defence of Western Europe, at all events in the earlier stages of a war. The air command goes to the nation which, of the Five Powers, can make the biggest contribution in the air. The functions of the Flag Officer, Western Europe, as outlined above, clearly indicate that the post is best held by a Frenchman.

(3) The plan is sound because it has been built from the bottom upwards, unlike, for example, the League of Nations, which was merely superimposed on national governments.

(4) It is designed to deal with the problem of the defence of an area occupied by five nations who would all be equally threatened by any aggression against it.

(5) It leaves the door open for expansion into a wider system of integrated defence.

(6) It recognises that the maritime defence of such an area cannot be treated in isolation from the world situation at sea.

Naturally the High Contracting Parties of the Treaty were anxious to secure the participation of the United States in the deliberations of this planning organisation and an invitation to them to do so was sent on July 15, 1949. Within three days an American delegation arrived in London and has ever since co-operated on a non-membership basis. This delegation, known as D.E.L.W.U., is on an inter-service basis under the United States Joint Chiefs-of-Staff and is accredited to the Military Committee. There is also a permanent American representative accredited to the Military Supply Board and Supply Executive Committee. Canada also sent a delegation.

All that has been said so far constitutes the background leading up to the conclusion of the North Atlantic Treaty, which was signed in Washington on April 4, 1949. The text of this Treaty will be found on pages 334–6. It was signed and ratified by seven Powers in addition to the High Contracting Parties of the Treaty of Brussels—Canada, Denmark, Iceland, Italy, Norway, Portugal, and the United States.

It is worth while to turn aside for a space and consider some of the doubts, hesitations, and other reactions experienced by various nations in connection with the question of whether or no they should sign the Treaty. The most outstanding point of all was, of course, that the adherence of the United States to the Treaty meant that a majority of the American people had at last reached the conclusion that George Washington's advice to them to avoid entangling alliances, though excellent in the eighteenth century, when the passage of the Atlantic took weeks, is out of date in the twentieth when it takes hours.

It will be observed that Article 5 of the Treaty is carefully worded so as to avoid any automatic commitment to war. It is left to each individual Power to decide what form the aid it gives to a threatened ally shall take. Unless this provision had been inserted in the Treaty the United States could not have signed it, because the American Constitution reserves the right of declaring war to Congress. At the time the Constitution was drawn up it is easy to understand that it was considered wise to put this safeguard in it. But in modern conditions is it really of much value? Supposing it did not exist, is it conceivable that any President and Secretary of State should become infected with megalomania and plunge the United States into an act of aggression? It meant nothing in the case of Pearl Harbour, and so long as American troops remain in occupation of their zone in Germany, the United States are likely to be committed to war in defence of Western Germany in much the same way as they were in 1941. The United Kingdom has no written Constitution, but the paper written by Lord Salisbury in 1901 and quoted earlier in this Chapter contains the following passage:

> "The British Government cannot undertake to declare war, for any purpose, unless it is a purpose of which the electors of this country would approve.

> If the government promised to declare war for an object which did not commend itself to public opinion, the promise would be repudiated and the government turned out."

This is as true today as when it was written half a century ago and it amounts to very much the same thing as the reservation to Congress of the right to declare war. It would not stand in the way of our vital interests, of which the security of Western Europe is certainly one.

That Canada should have signed the Treaty was natural and calls for no special comment. The inclusion of Portugal among the signatories serves to throw into greater relief the incompleteness of the Treaty so long as Spain and Eire are not parties to it. As regards Italy, it is only possible to express the hope that, if the Treaty is put to the test of war, she will prove an asset.

The case of the Scandinavian countries deserves more careful examination. Norway, Sweden, and Denmark form a geographical group which clearly has common defence interests. Norway and Sweden have the advantage that their topography does not lend itself to major land operations, nor are they easily entered across their eastern land frontier. They are not in themselves a very attractive target for aggression, but their occupation enables a powerful aggressor aiming at the subjugation of Western Europe to:

(*a*) Seal the entrance to the Baltic.
(*b*) Deny the passage of the Baltic to all but coastal traffic along its eastern and southern shores.
(*c*) Seriously interfere with the passage of the North Sea.
(*d*) Threaten the British Isles with air or rocket attack.

Whoever holds Iceland can of course also seriously interfere with the passage of the North Atlantic.

It is therefore clear that Scandinavia is of considerable importance to the defence of Western Europe and the Atlantic. It would have been very neat and sound if these countries could have started by concluding a defensive alliance of their own, on the lines of the Treaty of Brussels, and subsequently tacked it on to the Atlantic Treaty. But, as was only natural, their respective points of view to such proposals were dictated by their past experiences. What these were must therefore be briefly stated. Starting with the reign of Gustavus Adolphus early in the seventeenth century, Sweden, then a continental Power ruling Finland, Estonia, and parts of what is now Germany, engaged in considerable military activity on the Continent during two centuries. She ended this period bereft of all her Continental possessions and reduced to her share of the larger of the two Scandinavian peninsulars. An experience well calculated to instil a distrust of war into her national consciousness. Then in the twentieth century she twice successfully managed to keep out of world wars. Thus we see that she was not prepared to go further in the present situation than to consider a Scandinavian defence union to remain outside the great *blocs* of the world and to aim at neutrality in the event of war. But this was not enough for Norway and Denmark, with their bitter experiences of 1940. Iceland, with no military history, was able to view the problem with an open if inexperienced mind. In the event we see Norway, Denmark, and Iceland in the Atlantic Pact and Sweden out.

Article 9 of the Treaty establishes a Council to be assisted by a Defence Committee to recommend measures for the implementation of Articles 3 and 5. It will be observed that this framework is precisely similar to that established by the Treaty of Brussels. The Defence Ministers of the treaty Powers met in Paris on December 1, 1949, and approved a broad strategic concept which was adopted by the Atlantic Council in January 1950. They also directed plans for the defence of the North Atlantic area to be prepared. At a meeting held at The Hague in April 1950 the Defence Ministers approved the plan for collective self-defence recommended by their Chiefs of Staff. Thus, within six months of the commencement of deliberations on the point, the planning organisation had reached agreement on the general strategy of the defence of the area covered by the Treaty, prepared an estimate of the military situation should an attack be launched against any of the treaty Powers, and prepared plans for meeting such an attack. These plans were based on the conception of an integrated defence of the North Atlantic area, as distinguished from individual national defence.

This agreement marked a great advance on previous attempts to coordinate the defensive plans of several nations. Here we have no less than twelve nations bound together in a common plan to which each will contribute in accordance with its resources, both human and material. It must, however, be emphasised that all this is at present only a framework and an immense amount of detail as to the total resources required to implement the plan and how the responsibility for their provision is to be divided between the treaty Powers still remains to be filled in.

It will be observed that there is nothing in the organisation under the Treaty to correspond to the Commanders-in-Chief Committee established under the Treaty of Brussels. In considering the reflections to which this fact gives rise, we need to bear in mind the limits placed upon the area covered by the Treaty by Article 6, which is worth giving in detail here for easy reference:

> For the purpose of Article 5 an armed attack on one or more of the Parties is deemed to include an armed attack on the territory of any of the Parties in Europe or North America, on the Algerian Departments of France, on the occupation forces of any Party in Europe, on the islands under the jurisdiction of any Party in the North Atlantic area north of the Tropic of Cancer or on the vessels or aircraft in this area of any of the Parties.

How far-reaching are the commitments under the Treaty is perhaps best illustrated by the fact that, under the definition of the area covered contained in Article 6, Luxembourg is bound to render assistance—though not necessarily bound to go to war—if an attack is made upon the Pacific coasts of Canada and/or the United States. This illustration perhaps suffices to show how difficult it would be to set up in advance the framework of a command organisation to deal with the many hypothetical situations which might arise. The problem under the Treaty of Brussels was straightforward: it only had to deal with one likely situation. Hence it was possible to go a step further than in the case of the Atlantic Treaty.

There is also the question of the war at sea, which, for the purposes of the Treaty, is confined by Article 6 to the oceans north of the Tropic of Cancer. But, just as it is impossible to divorce the sea communications of Western Europe from the sea highways of the world, so it is impossible to divorce the sea highways north of the Tropic of Cancer from those south of it. The oceans must be regarded globally and not regionally.

When we consider the problem from the point of view of the land and the air, it is again clear that it is not on all fours with the Treaty of Brussels. Under the latter the land and air forces of the treaty Powers are faced by a plain, straightforward problem. Their task is to prevent the invasion of a clearly defined area the defence of which is vital to all five nations. Even so the members of the Commanders-in-Chief Committee actually command nothing until a hot war starts. They are only commanders designate. If this is as far as it is possible to go in preparing the command organisation in advance in the case of the clear-cut problem confronting the Treaty of Brussels Powers, clearly it is difficult to make similar preparations in the case of the Atlantic Treaty where the problems of land and air warfare are far more hypothetical. The issue might of course be settled in the cockpit of Europe, but alternatively it might conceivably hang on the result of a campaign in the Arctic regions.

Taking all factors into consideration, there appear to be three major obstacles in the way of the appointment of Commanders-in-Chief designate in connection with the Atlantic Treaty:

(1) Such officers on appointment need to be given a definite problem to solve. In the case of the defence of the North Atlantic area many of the problems are hypothetical.
(2) It is very improbable that Congress would agree to American forces serving under foreign commanders.
(3) The forces of the other treaty Powers can hardly be placed under an American Commander-in-Chief designate when the participation of the United States in any way depends, at all events in theory, upon the whim of Congress.

The next question which arises is what forces are necessary to ensure to security of the North Atlantic area? Under present circumstances the only potential enemy is the Soviet Union, with almost unlimited manpower and very important industrial resources. It appears probable that for the war at sea the U.S.S.R. would rely almost entirely on the very large fleet of the most modern type of submarines, which she is alleged to possess. The principal role of the navies of the treaty Powers will therefore be of an anti-submarine nature and they will need to be organised and equipped accordingly. At the same time it is well to remember that the true form of a people in war is always clearly revealed by their history. Throughout their history the Russian people have displayed little aptitude for maritime warfare, nor have any of the peoples of the satellite countries.

In the air the Russians fought the last war purely from the tactical angle. There again they are now alleged to have adopted a strategic outlook, but they lack experience in this respect. These facts are worth bearing in mind provided we do not allow them to become a stimulant to complacency.

This brings us to the question of what military forces would be required to maintain the security of the Low Countries and France until the full strength of the Atlantic Treaty Powers could be mobilised, the main problem as regards Western Europe. Two points must here be emphasized. First of all it is futile for anyone not in possession of all the information available only to those in official positions to attempt a detailed discussion of what forces one required for this purpose. Secondly, it may be suggested that the time has come when some new unit of measure for estimates of ground forces is badly needed. It is customary to express such estimates in numbers of divisions, and this did well enough in the days of World War I. But the complexity of the modern organisation of armies, the diverse types of divisions, and the immense ratio of the tail to the teeth make the term "division" a bad yardstick today. But for want of a better it must be used.

First of all it must be noted the Norwegian and Danish Armies will clearly be fully occupied with the defence of their own countries and will not be able to contribute to the defence of the main theatre, which it is generally estimated would require at least 30 divisions, including of course a high proportion of armour. It is clear that we have a long way to go before anything like that number will be available. The Dutch Army has but recently become free from the struggle in Indoniesia and will take some time to reorganise and equip itself. The French Army, also very inadequately equipped, is still involved in Indo-China. The Belgian Army has been free from such difficulties, but is not large. The British Army has worldwide commitments, which seriously prejudice the preparation of an adequate field force for employment in the main Western European theatre. The Luxembourg Army is negligible for obvious reasons. If we can count on two American divisions in the initial stages, that leaves 28 to be found by the Treaty of Brussels Powers. Belgium and Holland might each produce four, leaving 20 to be shared between the United Kingdom and France.

This reflection brings us to the most difficult question which arises from the strange and unprecedented situation which prevails today. Our forefathers of the nineteenth century would indeed have been astonished if they had been told that one day British troops would be responsible for the defence of a territory whose inhabitants were, by general international agreement, not allowed to defend themselves. Yet that is the situation today as regards Western Germany. Can the problem be solved without a German contribution in one form or another? If war was to break out now and the Armies of Occupation in Germany today become involved in the defence of their zones, many Germans would in fact play their part in the tail, though not in the teeth. Much of the transport of these armies is driven and maintained by Germans.

In conclusion we may turn back to the parable of the sheep with which this Chapter opened. What has happened so far may, in terms of the parable, be expressed as follows. The sheep in the Western European field, alarmed by the irruption of goats in the Czechoslovakian field, flocked together in the corner of their field known as Brussels. The attitude of the goats in the fields to the east continued to be so menacing that the sheep in the North Atlantic fields scampered up to join the Western European flock. The sheep in the outlying fields belonging to the British Commonwealth have so far only reached the stage of raising their heads suspiciously—they have not yet joined the North Atlantic flock. Thus we see that, in the present state of development of the human race, it is only in the face of obvious threat that men will effectively combine for their common defence.

E. H. WYNDHAM

CHAPTER V

THE OBJECTIVE IN WAR—BATTLE OR INDIRECT ACTION?

FOR A true understanding of the complex problem of the right objective, or military aim, in war it is necessary to know the background of military thought on this subject during the past two centuries, and to realise how conceptions have evolved.

A generation ago the prime canon of military doctrine was that "the destruction of the enemy's main forces on the battlefield" constituted the only true objective in war. That was universally accepted, engraved in all military manuals, and taught in all staff colleges. If any statesman ventured to doubt whether it fitted all circumstances, he was regarded as blasphemously violating holy writ—as can be seen in studying the official records and the memoirs of the military heads of the warring nations.

So absolute a rule would have astonished the great commanders and teachers of war theory in ages prior to the nineteenth century. For they had recognised the variability of circumstances and the practical necessity of adapting aims to limitations of strength and policy.

The rule acquired its dogmatic rigidity largely through the posthumous influence of Clausewitz and his books upon the minds of Prussian soldiers, particularly Moltke, and thence more widely through the impact that their victories in 1866 and 1870 made upon the armies of the world—which copied so many features of the Prussian system. As so often happens, Clausewitz's disciples carried his teaching to an extreme which their master had not intended.

CLAUSEWITZ'S THEORY

Misinterpretation has been the common fate of most prophets and thinkers in every sphere. Devout but uncomprehending disciples have been more damaging to the original conception than even its prejudiced and purblind opponents. It must be admitted, however, that Clausewitz invited misinterpretation more than most. A student of Kant at second-hand, he had acquired a philosophical mode of expression without developing a truly philosophical mind. His theory of war was expounded in a way too abstract and involved for ordinary soldier minds, essentially concrete, to follow the course of his argument—which often turned back from the direction in which it was apparently leading. Impressed yet befogged, they grasped at his vivid leading phrases, seeing only their surface meaning and missing the deeper current of his thought. Clausewitz's greatest contribution to the theory of war was in emphasising the psychological factors. Raising his voice against the geometrical school of strategy, then fashionable, he showed that the human spirit was infinitely more important than operational lines and angles. He discussed the effect of danger and fatigue, the value of boldness and determination, with deep understanding.

It was his errors, however, which had the greater effect on the subsequent course of history. He was too continental in outlook to understand the meaning of sea-power. And, on the very threshold of the mechanical age, Clausewitz was led to declare his "conviction that superiority in numbers becomes everyday more decisive." Such a "commandment" gave reinforcement to the instinctive conservatism of soldiers in resisting the possibilities of the new form of superiority which mechanical invention increasingly offered. It also gave a powerful impulse to the universal extension and permanent establishment of the method of conscription—as a simple way of providing the greatest possible numbers. This, by its disregard for psychological suitability, meant that armies became much more liable to panic, and sudden collapse. The earlier method, however unsystematic, had at least tended to ensure that the forces were composed of good "fighting animals."

In defining the objective, or military aim, Clausewitz was carried away by his passion for pure logic.

> "The aim of all action in war is to disarm the enemy, and we shall now show that this, in theory at least, is indispensable. If our opponent is to be made to comply with our will, we must place him in a situation which is more oppressive to him than the sacrifice we demand; but the disadvantages of this position must naturally not be of a transitory nature, at least in appearance, otherwise the enemy, instead of yielding, will hold out in the hope of a change for the better. Every change of this position which is produced by a continuation of the war must, therefore, be a change for the worse. The worst condition in which a belligerent can be placed is that of being completely disarmed. If, therefore, the enemy is to be reduced to submission . . . he must either be positively disarmed or placed in such a position that he is threatened with it. From this it follows that the complete disarming or overthrow of the enemy . . . must always be the aim of warfare."

The influence of Kant can be perceived in Clausewitz's dualism of thought—he believed in a perfect (military) world of ideals while recognising a temporal world in which these could only be imperfectly fulfilled. He was capable of distinguishing between what was militarily ideal and what he described as "a modification in the reality." Thus he wrote: "Reasoning in the abstract, the mind cannot stop short of an extreme, because it has to deal with an extreme, with forces left to themselves. . . . But everything takes a different shape when we pass from abstractions to reality." "This object of war in the abstract, this final means of attaining the political object in which all others are combined, the disarming of the enemy, is rarely attained in practice and is not a condition necessary to peace."

Clausewitz's tendency to the extreme is shown, again, in his discussion of battle as a means to the end of war. He opened with the startling assertion—"There is only one single means, it is the fight." He justified this by a long argument to show that in every form of military activity "the idea of fighting must necessarily be at the foundation." Having elaborately proved what most people would be ready to accept without argument, Clausewitz then admitted that "the object of a combat is not always the destruction of the enemy's forces" and that "its object can often be attained as well without the combat taking place at all."

Moreover, Clausewitz recognised that "against the far superior value which the destruction of the enemy's armed forces has over all other means, stands the expense and risk of this means." He confessed that "the waste of our own military forces must, *ceteris paribus*, always be greater the more our aim is directed upon the destruction of the enemy's power. The danger lies in this—that the greater efficacy which we seek recoils on ourselves, and therefore has worse consequences in case we fail of success." Out of his own mouth, Clausewitz here gave a prophetic verdict upon the consequences of following his own gospel in 1914–1918. For it was the ideal, and not the practical, aspect of his teaching on battle which survived. He contributed to the distortion by arguing that it was only to avoid the risks of battle that "any other means are taken." And he fixed the distortion in the minds of his pupils by hammering on the abstract ideal.

Not one reader in a hundred was likely to follow the sublety of his logic or to preserve a true balance amid such philosophical jugglery. But everyone could catch such ringing phrases as—"We have only one means in war—the battle." "The combat is the single activity in war." "We may reduce every military activity in the province of strategy to the unit of single combats." "The bloody solution of the crisis, the effort for the destruction of the enemy's forces, is the first-born son of war." "Only great and general battles can produce great results." "Let us not hear of generals who conquer without bloodshed."

By the reiteration of such phrases Clausewitz blurred the outlines of his philosophy, already indistinct, and made it into a mere marching refrain—a Prussian *Marseillaise* which inflamed the blood and intoxicated the mind. In transfusion it became a doctrine fit to form corporals, not generals. For by making battle appear the only "real warlike activity," his gospel deprived strategy of its laurels, reduced the art of war to the mechanics of mass-slaughter, and incited generals to seek battle at the *first* opportunity, instead of creating an *advantageous* opportunity.

Clausewitz contributed to the subsequent decay of generalship when in an oft-quoted passage he wrote—"Philanthropists may easily imagine that there is a skilful method of disarming and over-coming the enemy without great bloodshed, and that this is the proper tendency of the Art of War. . . . This is an error which must be extirpated." It is obvious that when he wrote this he did not pause to reflect that what he decried had been regarded as the proper aim of generalship of all the masters of the art of war—including Napoleon himself. Yet Clausewitz's phrase would henceforth be used by countless blunderers to excuse, and even to justify, their futile squandering of life in bull-headed assaults. The danger was increased because of the way he constantly dwelt on the decisive importance of a numerical superiority. With deeper penetration, he pointed out in one passage that surprise lies "at the foundation of all undertakings, for without it the preponderance at the decisive point is not properly conceivable." But his disciples, struck by his more frequent emphasis on "numbers," came to regard mere mass as the simple recipe for victory.

Even worse was the effect of his theoretical exposition, and exaltation, of the idea of "absolute" warfare—in proclaiming that the road to success was through the unlimited application of force. Thereby a doctrine which began by defining war as "only a continuation of state policy by other means" led to the contradictory end of making policy the slave of strategy—and bad strategy at that.

The trend was fostered, above all, by his dictum that—"To introduce into the philosophy of war a principle of moderation would be an absurdity. War is an act of violence pushed to its utmost bounds." That declaration has served as a foundation for the extravagant absurdity of modern total warfare. His principle of force without limit and without calculation of cost fits, and is only fit for, a hate-maddened mob. It is the negation of statesmanship and of intelligent strategy—which seeks to serve the ends of policy. If war be a continuation of policy, as Clausewitz had elsewhere declared, it must necessarily be conducted with a view to post-war benefit. A state which expends its strength to the point of exhaustion bankrupts its own policy.

That hard truth of experience, which has been brought home to us after victory in 1918 and 1945, had been well appreciated two centuries earlier—in "the age of reason." A long series of mutually exhausting and devastating wars, above all the Thirty Years War, had brought statesmen by the eighteenth century to realise the necessity, when engaged in war, of curbing both their ambitions and their passions in the interest of their purpose. On the one hand, this realisation tended to produce a tacit limitation of warfare—an avoidance of excesses which might damage after-the-war prospects. On the other hand, it made them more ready to negotiate a peace if and when victory came to appear dubious of achievement. Their ambitions and passions frequently carried them too far, so that the return to peace found their countries weakened rather than strengthened, but they had learnt to stop short of national exhaustion.

Clausewitz himself had qualified his principle of "utmost force" by the admission that "the political object, as the original motive of the war, should be the standard for determining both the aim of the military force and also the amount of effort to be made." Still more significant was a reflective passage in which he remarked that to pursue the logical extreme entailed that "the means would lose all relation to the end, and in most cases the aim at an extreme effort would be wrecked by the opposing weight of forces within itself."

His classic work "On War" was the product of twelve years' intensive thought; if its author had lived to spend a longer time in thinking about war, he might have reached wiser and clearer conclusions. As his thinking progressed, he was being led towards a different view—penetrating deeper. Unhappily, the process was cut short by his death from cholera in 1850. It was only after his death that his writings on war were published, by his widow. They were found in a number of sealed packets, bearing the significant and prophetic note—"Should the work be interrupted by my death, then what is found can only be called a mass of conceptions not brought into form . . . open to endless misconceptions."

Much of the harm might have been avoided but for that fatal cholera germ. For there are significant indications that in the gradual evolution of his thought he had reached a point where he was about to drop his original concept of "absolute" war, and revise his whole theory on more common-sense lines—when death intervened. In consequence, the way was left open to "endless misconceptions" far in excess of his anticipation—for the universal adoption of the theory of unlimited war has gone far to wreck civilisation. The teachings of Clausewitz, taken without understanding, largely influenced both the causation and the character of the World War I. Thereby it led on, all too logically, to the World War II.

THEORY IN FLUX—AFTER WORLD WAR I.

The course and effects of the first world war provided ample cause to doubt the validity of Clausewitz's theory, at least as interpreted by his successors. Innumerable battles were fought without ever producing the decisive results expected of them. But the responsible leaders were slow to adapt their aim to circumstances or develop new means to make the aim more possible. Instead of facing the problem, they pressed theory to a suicidal extreme, draining their own strength beyond the safety limit, in pursuit of an ideal of complete victory by battle which was never fulfilled. That one side ultimately collapsed was due more to emptiness of stomach, produced by economic pressure, than to loss of blood—although the blood which was lost in the abortive German offensives of 1918, and the loss of spirit in consequence of their palpable failure to gain the victory, hastened the collapse. If this provided the opposing nations with the *semblance* of victory, their efforts to *win* it cost them such a price, in moral and physical exhaustion, that they, the seeming victors, were left incapable of consolidating their position.

It became evident there was something wrong with the theory, or at least with its application—alike on the planes of tactics, strategy, and policy. The appalling losses suffered in vain pursuit of the "ideal" objective and the post-war exhaustion of the nominal victors showed that a thorough re-examination of the whole problem of the objective was needed. Besides these negative factors there were also several positive reasons to prompt a fresh enquiry. One was the decisive part that sea-power had played, without any decisive battle at sea, in producing the enemy's collapse by economic pressure. That raised the question whether Britain in particular had not made a basic mistake in departing from her traditional strategy and devoting so much of her effort, at such terrific cost to herself, to the prolonged attempt to win a decisive victory on land.

Two other reasons arose from new factors. The development of air forces offered the possibility of striking at the enemy's economic and moral centres without having first to achieve "the destruction of the enemy's main forces on the battlefield." Airpower might attain a direct end by indirect means—hopping over opposition instead of overthrowing it. At the same time, the combined development of the petrol motor and the caterpillar track opened up a prospect of developing mechanised land forces of high mobility, which in turn foreshadowed a newly enlarged possibility of producing the collapse of "the enemy's main forces" without a serious battle—by cutting their supply-lines, dislocating their control-system, or producing paralysis by the sheer nerve-shock of deep penetration into their rear.

Mechanised land forces of this new kind might also provide—like air power, though in a lesser degree—the possibility of striking direct at the heart and nerve-system of the opposing country. While air-mobility could achieve such direct strokes by an overhead form of indirect approach, tank-mobility might achieve them by indirect approach on the ground avoiding the "obstacle" of the opposing army. To illustrate the point by a board-game analogy, with chess, air-mobility introduced a knight's move and tank-mobility a queen's move into warfare. This analogy does not, of course, express their respective values. For an air-force combined the vaulting power of the knight's move with the all-ways flexibility of the queen's move. On the other hand, a mechanised ground force, though it lacked vaulting power, could remain in occupation of the "square" it gained.

These new air and land developments were bound to have a profound influence on the choice of objectives in future war. They increased the capacity of applying military action against civil objectives, economic and moral, while making it more powerful in effect. They also increased the "range" of military action against military objectives, making it easier to overthrow an opposing "body"—such as an army—by paralysing some of its vital organs instead of having to destroy it physically and as a whole by hard fighting. To nullify opposition by paralysing the power to oppose is far better economy of force than actual destruction of opposition, which is always a more prolonged process and more costly to the victor. Air power promised new scope for producing such paralysis of armed opposition—besides its capacity to evade opposition and strike at civil objectives in the enemy country.

The sum effect of the advent of this multiplied mobility, both on the ground and in the air, was to increase the power and importance of strategy relatively to tactics. The higher commanders of the future would have the prospect of achieving decisive results much more by movement than by fighting compared with their predecessors. While the value of winning a decisive battle would not disappear, and the chances of doing so would actually be increased by the new powers of mobility, even such a battle would have less of the traditional battle form. It would become more like the natural completion of a strategic manœuvre. "Battle" is really a misnomer for such a consecutive operation.

Unfortunately, those who were at the head of the armies after World War I were slow to recognise the need of a fresh definition of the military aim in the light of changed conditions and war instruments. Unfortunately, also, those who were at the head of the air forces were too exclusively concerned to assert their independence, and thus concentrated too narrowly on exploiting the possibilities of striking at civil objectives—without regard either to its limitations or to its detrimental results. Filled with a natural enthusiasm for the new service to which they belonged, they were excessively confident that it could produce either the speedy moral collapse of the opposing people or the economic stranglehold of sea-power in an intensified form and with much more quickly decisive effect.

PRACTICE IN WORLD WAR II

When the next war came, the handful of new land forces of a mechanised kind that had been created amply fulfilled the claims that had been made for them, and for their decisive effect if employed for long-range strokes at strategic objectives. A mere six divisions of this kind were largely instrumental in producing the collapse of Poland within a few weeks. A mere ten such divisions virtually decided the so-called "Battle of France" before the main mass of the German Army had even come into action—and made the collapse of all the Western countries an almost inevitable sequel. This conquest of the West was completed in barely a month's campaign, with amazingly small cost to the victor. Indeed, the "bloodshed" all round was very slight, and in the decisive phase trifling, by any Clausewitzian standard.

While this sweeping victory was attained by action against objectives of a military nature, it was mainly through action of a manœuvre form—strategic more than tactical. Moreover, the effect of cutting the opposing armies' communications and dislocating their control-system in the deeply penetrating drive is hard to distinguish from its accompanying effect in shaking the people's morale and disrupting civic organisation. So it could be termed as, at least in part, a proof of the new effectiveness of operating against civil objectives.

Similar reflections apply to the even swifter conquest of the Balkans in April 1941—which once again demonstrated the paralysing effect of the new instruments and their strategic application. "Battle" was insignificant in comparison and "destruction" palpably an inappropriate term for the way that the decision was achieved.

When it came to the invasion of Russia a somewhat different method was tried. Many of the German generals—particularly Halder, the Chief of the General Staff—complain of Hitler's tendency to aim at economic rather than military objectives. But analysis of the operational orders and of their own evidence does not bear out the charge. While Hitler was inclined to think that the economic aim would be more effective, it is clear that in the crucial period of the 1941 campaign he conformed to the General Staff's preference for fighting battles. The pursuit of this aim did not prove decisive, although it produced several great victories in which immense forces of the enemy were destroyed. Whether concentration on economic objectives would have been more decisive remains an open question. But in reflection some of the ablest of the German generals consider that the best chance of defeating Soviet Russia was lost by aiming to win battles in the "classical" way, instead of driving through as fast as possible to the moral-cum-enonomic objectives offered by Moscow and Leningrad—as Guderian, the leading exponent of the new school of mechanical mobile warfare, wished to do. On this key question Hitler had sided with the orthodox school.

In the series of swift German conquests, the air force combined with the mechanised elements of the land forces in producing the paralysis and moral disintegration of the opposing forces and of the nations behind. Its effect was terrific, and must be reckoned fully as important as that of the *Panzer* forces. The two are inseparable in any valuation of the elements that created the new style of lightning warfare—the *blitzkrieg*.

Even greater was the contribution that the British and American air forces made, later in the war, to the success of the Allied armies and navies. It was due to the former, above all, that the Allied invasion of the Continent became possible in the first place, and then an assured advance to victory. By their strategic action against military objectives—particularly communications—they had a decisively crippling effect on the ability of the German armies to counter the Allied moves.

The Air Staffs, however, never showed the same eagerness to conduct operations of this kind as they did to pursue independent operations against "civil" objectives—the attack on the industrial centres of the opposing country. Its purpose as conceived was to combine a direct economic and moral effect on the opposing nation, in the belief that it would prove more decisive, and more quickly decisive, than co-operative action against the enemy's armed forces. Although the Air Staffs termed this "strategic bombing," the term was really a misnomer, for such an aim and action lies in the sphere of grand strategy. It would be more correctly defined as "grand strategic bombing," or, if that seems too cumbrous a term, as "industrial bombing," a term which covers moral as well as economic effect.

The actual effect which this kind of bombing achieved as a contribution to victory is very difficult to assess despite much detailed investigation. The estimation of the data is confused by partisan assessments, both by those who favoured industrial bombing and by those who opposed it on various grounds. But apart from the fog thus created, a correct assessment is handicapped and made almost impossible by the amount of *imponderabilia* in the data—even more than in the evidence about any other form of military action.

But it seems fairly certain, even on a reasonably favourable view of its effects, that they were less decisive than the action of air forces against strategic objectives—in the military sphere. In any case, they were much less clearly decisive. It is also clear that, stage by stage throughout the war, the result fell far short of what was being claimed for this kind of action by those who were conducting it.

Still clearer is the extremely detrimental effect of industrial bombing on the post-war situation. Beyond the immense scale of devastation, hard to repair, are the less obvious but probably more lasting social and moral effects. This kind of action inevitably produces a deepening danger to the relatively shallow foundations of civilised life. That common danger is now immensely increased by the advent of the atomic bomb.

The object of any nation that goes to war can be epitomised as that of attaining a better post-war situation. Hence it is essential to conduct war with constant regard to the peace you desire. Here we are brought to the fundamental difference between strategy and grand strategy. The function of grand strategy is to co-ordinate and direct all the resources of a nation towards the attainment of the political object of the war—the goal defined by national policy. Whereas strategy is only concerned with the problem of winning military victory, grand strategy must take the longer view—for its problem is the winning of the peace. Such an order of thought is not a matter of "putting the cart before the horse," but of being clear where the horse and cart are going.

Air action against an object that is primarily "civil" is action on the plane of grand strategy. It is called into question on that very account. By the test of its own nature, it is seen to be an unsound objective. It would be an unwise choice as a military aim even if its ability to decide a war were more conclusively proved, or at least more clearly demonstrated, than it actually has been.

FURTHER REVISION OF THEORY

In trying to revise any theory and readjust it for better balance, it is a help to have a background of study in the subject—as long as one is willing to modify one's conclusions. I was, so far as I know, the first student of war after 1914–1918 to make a re-examination of the prevailing doctrines, derived from Clausewitz, about the objective in war. After calling it in question in a number of articles in the military journals, I dealt with it more fully in *Paris, or the Future of War*, 1925.

This little book began with a criticism of the way that the orthodox objective, "the destruction of the enemy's main forces on the battlefield," had been pursued in World War I—pointing out its indecisive and exhausting results. It then went on to argue the advantages of the "moral objective," showing (i) how armoured forces might deliver a decisive blow against "the Achilles' heel of the enemy army, the communications and command centres which form its nerve system"; (ii) how air forces, besides co-operating in this strategic action, might also strike with decisive effect direct at "a nation's nerve system," its "static civil centres" of industry. The General Staff prescribed the book for the study of the officers of the first Experimental Mechanised Force when this was formed two years later. The Air Staff, less surprisingly, made still fuller use of it—there was then a lack of text-books on air strategy, and it fitted the developing trend of their views on the subject. The Chief of the Air Staff distributed copies of it to his fellow Chiefs of Staff!

The present article is thus a revision of what I wrote a quarter of a century ago—and an avowal of error over part of the thesis. It shows how in correcting the balance one is apt to tilt it too far the other way. T. E. Lawrence observed in a letter he wrote me in 1928: "The logical system of Clausewitz is too complete. It leads astray his disciples—those of them, at least, who would rather fight with their arms than with their legs. . . . You, at present, are trying (with very little help from those whose business it is to think upon their profession) to put the balance straight after the orgy of the last war. When you succeed (about 1945) your sheep will pass your bounds of discretion, and have to be chivied back by some later strategist. Back and forward we go."

In 1925 I myself went too far in arguing the advantages of the air stroke at civil objectives—though I did qualify this by emphasising the importance of executing it in such a way as to inflict "the least possible permanent injury, for the enemy of today is the customer of the morrow and the ally of the future." My belief then was that "a decisive air attack would inflict less total damage and constitute less of a drain on the defeated country's recuperative power than a prolonged war of the existing type." In further study I came to realise that an air attack on industrial centres was unlikely to have an immediately decisive effect, and more likely to produce another prolonged war of attrition in a fresh form—with perhaps less killing but more devastation than the 1914–1918 form. But when one began to point this out, one soon found that the Air Staff was far less receptive to the revised conclusion than to the original conclusion! They continued to cherish faith in a speedy decision, and when war experience compelled them to relinquish it, they pinned their faith instead to industrial attrition—as fervently as the General Staff of the last war had done to man-power attrition.

Nevertheless, a realisation of the drawbacks and evils of taking the civil fabric as the objective does not mean the restoration of "battle" in the old sense as the objective. The drawbacks of that Clausewitzian formula were amply shown in World War I. In contrast, World War II demonstrated the advantages and new potentialities of indirect, or strategic, action against a military objective—amply confirming what had been forecast in that respect. Even in the past such action had been effectively exploited by some of the "Great Captains," despite the limitations of their instruments. But now, with the help of new instruments, it proved still more decisive—despite the increased strength of tactical resistance. The new mobility produced a flexibility, in varying the directive of thrust and threat, which "disarmed" such resistance.

The time has come for a fresh revision of the doctrine of the objective, or military aim, in the light of recent experience and present conditions. It is much to be desired that it should be undertaken on a Combined Service basis, to produce an agreed solution—for there is a dangerous discordance of doctrine at present.

The outlines of a revised theory fitted to present conditions and knowledge have emerged, I hope, in the course of this discussion of the subject. The key idea is "strategic operation" rather than "battle"—an old term that has outlived its suitability and utility. Battles may still occur, but should not be regarded as the objective itself. To repeat an earlier conclusion that was strikingly vindicated in World War II—the "true aim is not so much to seek battle as to seek a strategic situation so advantageous that if it does not of itself produce the decision, its continuation by a battle is sure to achieve this."

B. H. LIDDELL-HART

CHAPTER VI

THE INFLUENCE OF THE THIRD DIMENSION IN WAR

THE CLASSICAL DOCTRINE

It is sometimes said that the Air Staff claim that the coming of the third dimension in warfare has made obsolete the well-known basic principles of war. They are accused of wanting to erect entirely new principles and to cast away the accumulated wisdom of the past, because, in the changed circumstances, it is valueless and, indeed, misleading. Nothing could be further from the truth. Indeed, the new doctrine of the correct use of air power is firmly based on the old principles.

The misunderstanding has arisen as a result of failure to distinguish between doctrine and principles. When a subject has been intensively studied for a long time, a number of principles emerge and gain general acceptance. These principles do not and cannot change. As a result of applying these principles, a body of doctrine is gradually built up. If the circumstances change slowly or but little the doctrine becomes widely known and accepted. Finally, it becomes known as the "classical doctrine," and woe betide any man who would commit the sacrilege of questioning its validity or of referring back to the unchanging principles from which it has been derived. And so the principles tend to be forgotten, while the doctrine, growing steadily more out of date, demands uncritical allegiance from each succeeding generation.

Now, although the principles do not change, the application of them can and does change with altered circumstances. It is therefore important that the doctrine should frequently be overhauled in the light of new conditions and, if necessary, a new doctrine, based on the unchanging principles, formulated.

For a very long time the conduct of warfare has been confined within the scope of two dimensions. Armies and fleets could move only on the surface of the land or sea. In these circumstances it was not possible effectively to evade the enemy's army and occupy his capital, nor safely to avoid his fleet and proceed to destroy or blockade his ports. Indeed, the attempt might be attended by great risks, exposing an army to attack in flank or rear, and gravely endangering its communications. Or a fleet might be caught at a serious tactical disadvantage, with no room for manœuvre, and be brought to disaster.

Thus the doctrine was evolved that such things could not be undertaken until the armed forces of the enemy had been dealt with. This doctrine remained valid so long as war was fought in two dimensions. In course of time, therefore, it became the "classical doctrine," and it was laid down that the object in war must always be to bring the enemy's armed forces to battle and destroy them.

Such destruction was, in the old days of simple weapons, mainly achieved by killing men. Hence another association of ideas, that the object in war is to kill large numbers of the enemy's fighting men. Thus, to the average man in the street, the idea of killing the enemy's troops or seamen in wartime is quite proper and, indeed, praiseworthy, while the killing of enemy civilian factory workers, engaged in manufacturing engines of destruction, is improper and unjustifiable.

This is because people, through long usage, have become accustomed to the idea of killing soldiers and sailors, but, be it noted, it is proper to kill them only in certain ways. You may shoot or bayonet them, blow them up, drown or burn them, but you must not gas them or infect them with disease. But if we look back into military history we shall find that every new weapon was, for a time, regarded with horror and attempts made to outlaw it. The knights in armour very naturally objected to the musketeer, whose bullets penetrated their armour and made it obsolete. Several attempts were made during the Middle Ages to prohibit the use of gunpowder in battle.

And yet, nowadays, when we review the vast array of weapons that human ingenuity has put into our hands, we cannot reasonably affirm that to gas a man is less humane than to bayonet him in the stomach or tear off his arms and legs with high explosives. The fact is that we become accustomed to things that, in themselves, are very horrible, and thus reconcile ourselves to their use. It is by much the same mental process that we have become used to, and accept, the "classical doctrine" concerning the destruction in battle of the armed forces of the enemy.

Now, having taken a glimpse at one or two of the absurdities into which we can be led by the uncritical acceptance of ideas and doctrines with ancient and honourable pedigrees, let us go back to the heart of the matter and consider what is the object in war.

THE OBJECT IN WAR

The object in war can be simply defined. It is, broadly speaking, to compel the enemy to abandon his intentions and submit himself to ours. Set out like this, it would seem that in modern conditions there may be many ways of achieving this object. Let us consider the matter a little further.

Although men are still the most valuable and irreplaceable factor in the composition of the armed forces, nowadays men without weapons and equipment, much of it of the most elaborate nature, are almost powerless. This growth of the importance of weapons and equipment has been a gradual development, with its roots deep in the two-dimensional era, making its first appearance in fighting at sea. For a long time now the sea power of a nation could be destroyed if its ships were sunk or taken, even if no single sailor lost his life or was captured. Without suitable ships the sailor is quite ineffective. On land, armies have gradually come to depend more and more on their artillery and transport. In recent times we have seen the armoured fighting vehicle take its place as the master weapon of the land forces, and no army would consider taking the offensive if deprived of them. Moreover, aircraft have become indispensable, and no major operation at sea or on land can be undertaken until a favourable situation in the air has been created.

The operation and control of these modern weapons demands an almost incredible variety of radio and radar instruments, which in their turn require an army of technicians to operate and service them. The need for this mass of equipment has the effect of tying down the greater part of the manpower of a nation to its production and maintenance, while those who do the actual fighting tend to be less numerous and more highly trained than before. The whole manpower, resources, and industry of a nation in war, nowadays, are geared to its war machine.

With the coming of long-range air bombardment, the whole of this war machine, and not only the armed forces, lies open to attack. Depending upon the circumstances, therefore, the enemy may be compelled to accept our terms by destroying his armed forces in battle, by destroying his industrial capacity to make war, by destroying his fuel supplies, by paralyzing his communications, by starving him out, by undermining the morale of his people, or, more probably, by a combination of two or more of these methods. The actual courses chosen should, of course, be those which appear to be most economical and most likely to succeed.

THE THIRD DIMENSION

It might have been expected that so drastic a development as the coming of the third dimension into warfare would make it necessary to refer once more to the basic principles, and review the "classical doctrine" in the light of this profound change. It is natural that the Royal Air Force, the coming of which (with the submarine) has made possible the use of the third dimension in war, should decline to be constrained within the limitations laid down by the strategic doctrine of two-dimensional warfare. It is equally natural that the two older Services, imbued with the centuries-old tradition of the "classical doctrine," should have resisted these ideas, and complained that sacriligious hands were tampering with the sacred beliefs which in the past had served us well. And so we have seen, during the last thirty years, efforts to secure acceptance of a new strategic doctrine, designed to exploit fully the new techniques which the third dimension has made available.

Although aircraft and submarines were available to both sides in considerable numbers, World War I was essentially a two-dimensional struggle. Its strategy was firmly based on the "classical doctrine." An example of this can be seen in the intense preoccupation of the Admiralty with the destruction of the German High Seas Fleet, and their comparative neglect of the real threat to our security, the German U-boats. Not until the mounting losses of our merchant shipping brought us within sight of defeat did they fully realise that, even if they destroyed the High Seas Fleet, they might still lose the war at sea. In the end, of course, the High Seas Fleet remained intact until the Armistice, and was surrendered to the victorious powers.

On land, in Western Europe, the air forces were chained to a two-dimensional strategy that had become almost bankrupt. For nearly four years the Allied and German armies faced each other, entrenched in an elaborate system of earthworks. There was no significant gain or loss of territory on either side, but the toll of human life and the conditions in which the troops had to live and fight were appalling. All but a very few of our numerous squadrons of aircraft were fully employed on routine army co-operation tasks, mainly reconnaissance, both visual and photographic, and the control of artillery fire. Such bombing as there was had a strictly local and tactical significance, and air fighting was mainly incurred in the task of protecting the army co-operation aircraft.

It is true that the Royal Naval Air Service had, from early in the war, carried out bombing attacks against submarine and Zeppelin bases, and that after the formation of the Royal Air Force in 1918 a small bomber force was set up to attack German factories and communications in the Rhineland. But it is also true that, when the war ended, very little practical experience of the offensive power of aircraft had been gained.

The coming of peace, however, saw one important change from our pre-war organisation. The Royal Naval Air Service and the Royal Flying Corps had been fused together to form the Royal Air Force. This meant that the use of the third dimension in war would be the subject of continuous study and experiment by the newly constituted Air Staff. The threat to the classical doctrine inherent in such an arrangement was obvious, and the more conservative elements in the older Services refused to accept the necessity or even the desirability of a third and separate Service. For many years unceasing efforts were made to revert to the former organisation, by dividing up the Air Force between the Army and Navy.

The minor military operations which occurred between the two world wars did not add much to our practical knowledge of what aircraft could achieve. There was therefore in existence a large body of theory about air warfare, and a lively state of controversy as to the correct use of air power. The Germans, however, tried out some of their theories in the civil war in Spain, and showed the world that modern aircraft had considerable powers of destruction and could, in the absence of effective air defences, completely destroy a town.

As a result, on the outbreak of World War II there existed a state of ignorance about the potentialities of aircraft that was, if anything, greater than our ignorance about the potentialities of armoured warfare on land.

STRATEGIC BOMBING

We began World War II with a plan very similar to that adopted in 1914. German preoccupation in Poland in the autumn of 1939 allowed us to transport an expeditionary force to the Continent without interference from the enemy air forces, and deploy it in line with the French armies, which were mainly absorbed into the Maginot Line. In adopting this plan we were no doubt strongly influenced by political considerations, but we are concerned here only with its strategic aspects. Its one merit was that it collapsed utterly, leaving nothing behind, and compelled us, alone and without Allies, facing the Germans across the narrow waters of the Channel, to think out a new strategy. It was now for us a matter of life or death, and we could not afford mistakes. Making such preparations as we could, we stood on guard awaiting the German onslaught.

Hitler wished to conquer this country and thus bring the war to an end, but he realised that he could not do so without a loss of life greater than he was willing to accept, until he had destroyed our Air Force. This done, he could seize command of the air over the Channel and our southern shores. He would be able to ensure the safe passage of his armies across the sea, and invade this country which, after Dunkirk, had virtually no effective land forces.

He attacked a variety of targets in this country—ports, airfields, towns, and cities—in the hope of bringing our air forces to battle on advantageous terms, and destroying them. In this attempt he failed, because, although we had to suffer casualties and damage, his attacks on us were not a vital threat. Thus we were able to employ our forces, with skill and discretion, in such a way that it was his air forces, not ours, that were destroyed. In the end, he lost upwards of a thousand aircraft and achieved very little.

It would have been far otherwise if Hitler had decided at all costs to destroy utterly the only three aero-engine factories we possessed at that time. It might have cost him five hundred, perhaps even a thousand aircraft, but it would have cost us the war. Hitler failed largely because he was attempting to adhere to the classical doctrine of two-dimensional warfare in a war of three dimensions.

With the close of the Battle of Britain, the defensive phase came to an end for us. The Germans were hesitating, and if we could assume the offensive, we had a chance of seizing and holding the initiative. What were our prospects of doing so?

There were two courses open to us. We could attack the Axis forces in North Africa, or we could launch a strategic bombing attack on German war industries and communications. The first course was in line with the classical doctrine of destroying the enemy's armed forces in battle, but it had the disadvantages that the forces were mainly Italian, and that everything had to be sent there over very long and dangerous sea routes. Also, though important, it was not a vital area, in the sense that operations there could neither win nor lose the war. The second course was not in line with the classical doctrine. It was a product of three-dimensional strategic thinking. It did not aim at the destruction in battle of the enemy's armed forces. Its aim was the progressive destruction of German war industries, communications, and will-to-war in the hope of creating a situation in which it would be possible for our armies to regain a foothold on the Continent. This would, of course, imply the possession, on our part, of air superiority, but it was hoped that in the course of our bombing campaign the German air force would be thrown on the defensive and defeated. Finally, with unchallenged air supremacy, the combined effort of our armies and air forces would thrust back the German armies and occupy their country.

Heaven knows, in the autumn of 1940 that prospect seemed a very long way off. Nevertheless, a strategic bombing campaign against Germany was the only course of action that held out even a remote hope of making it come true. But at the time many voices were raised in protest. They demanded that the heavy bombers should be confined to attacking the enemy's capital ships, hunting his submarines throughout the seven seas, or sent to North Africa to support our armies, and they appealed to the "classical doctrine" in support of their views. Fortunately these views did not prevail, and I have no doubt that our decision to carry out a strategic bombing campaign against Germany was right.

We decided also to attack the Axis forces in North Africa, and thus adopted both courses. This, indeed, was very natural, since a large-scale air assault was a new thing, and we were unwilling to adopt it as our sole offensive course of action.

It is, I think, demonstrable that, although we could conceivably have won the war in 1945 if the campaign in North Africa had never been fought, we could not have invaded Europe in 1944 and beaten the Germans without the Allied strategic bombing campaign. It is worth noting, in passing, that during the campaign the German air force was in fact thrown on to the defensive and decisively defeated, as a result of its desperate but unsuccessful efforts to protect vital targets in the German homeland.

JUSTIFICATION OF THE NEW DOCTRINE

So the new doctrine was justified in the hard test of war. Surely we now see clearly that, while the destruction of the enemy's armed forces is still very important and no opportunity of bringing it about economically should be missed, we need no longer harness all our efforts to doing it, in the traditional way, in battle. The coming of the third dimension has made it possible to immobilise or neutralise his forces in many ways, by, for example, destroying fuel supplies, knocking out vital war industries, or paralysing communications. No doubt the final destruction will usually be in battle, but it will be in the nature of a *coup de grâce.*

It must therefore now be recognised that this new power of long-range air bombardment has destroyed the validity of the classical doctrine. The eternal principles are, of course, unchanged, but they can and must be applied in new ways. The immense increase in range and destructive power, now made possible by modern technique and atomic bombs, makes it imperative not to allow adherence to out-of-date doctrines to cloud our minds or tie our hands. The results of mistaken strategic thinking in the future will be so disastrous that recovery from them may be impossible.

We must therefore see to it that we think out the new problems of our new age in accordance certainly with the immutable principles, but in freedom from the cramping effects of "classical doctrines" and outworn ideas of all kinds. Only by so doing can we ensure that we are getting the best value for our defence expenditure, and that we are not laying ourselves open to the most deadly of all weapons—strategic surprise.

R. H. M. S. Saundby

CHAPTER VII

STATESMEN AND FIGHTING MEN: THE CENTRAL DIRECTION OF WAR

THIS CHAPTER deals with only a single aspect of a vast and complex subject, viz. the focus and most important expression of the war-time relationship between statesmen and fighting men in the central direction of a nation's war effort.

In Britain during the World War II ultimate responsibility and authority for direction of the war effort were vested in the War Cabinet, which in accordance with long-matured plans came into existence at the outbreak of hostilities. But although the seat of final authority and responsibility remained unaltered throughout the war, the structure and working of the supreme directing bodies underwent important changes before they became fully adequate.

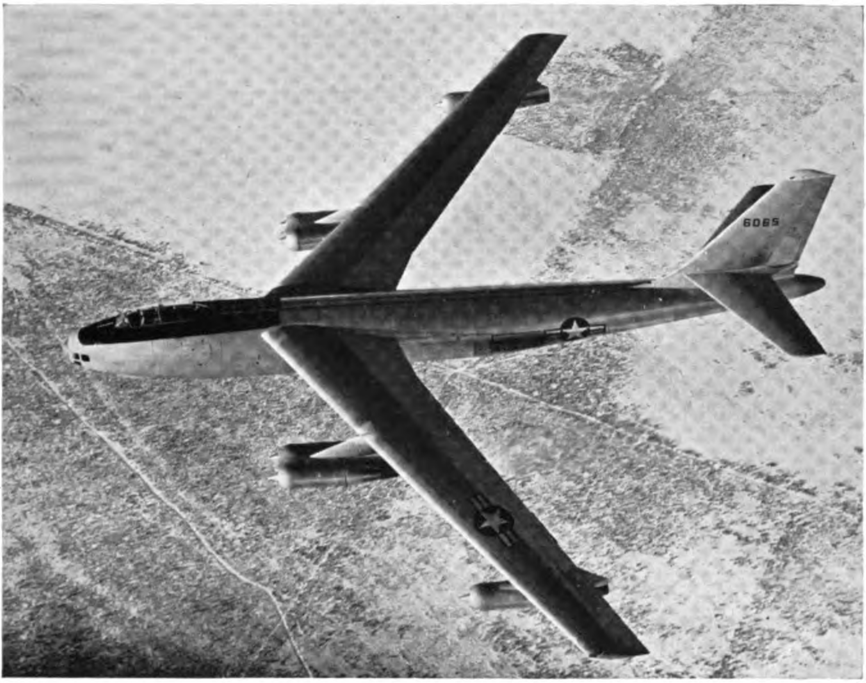
Originally the War Cabinet included nine ministers, and worked through a committee system organised into five main groups dealing respectively with military questions and intelligence, home policy, civil defence, economic policy, and priorities. Each group comprised a main ministerial committee and other committees. On the formation of the War Cabinet at the outbreak of war, the secretariats of the Cabinet and the Committee of Imperial Defence were merged to form the secretariat of the War Cabinet and its military and civilian committees.

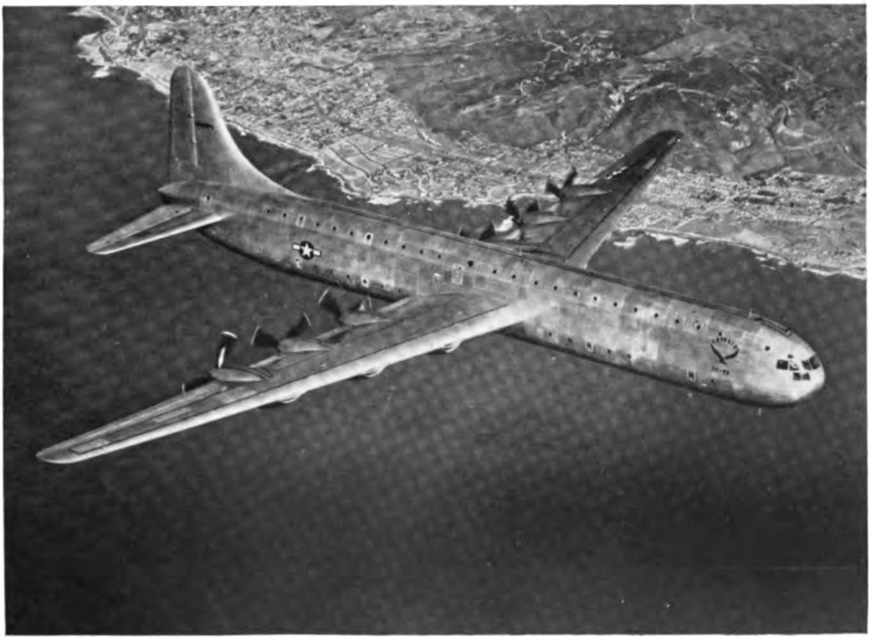
Mr. Neville Chamberlain's War Cabinet consisted at first of himself as Prime Minister, five ministers with departments (the Foreign Secretary, the Chancellor of the Exchequer, the First Lord of the Admiralty, and the Secretaries of State for War and for Air), and three ministers without departmental duties (the Minister for Co-ordination of Defence, the Lord Privy Seal, and a Minister without Portfolio). There were also other ministers who were not members of the War Cabinet. The main committees dealing with military operations and intelligence were two—the Standing Ministerial Committee on Military Co-ordination and the Chiefs of Staff Committee. The Military Co-ordination Committee was set up by the War Cabinet in October 1939 with the following terms of reference:

> To keep under constant review, on behalf of the War Cabinet, the main factors in the strategical situation and the progress of operations, and to make recommendations from time to time to the War Cabinet as to the general conduct of the war.

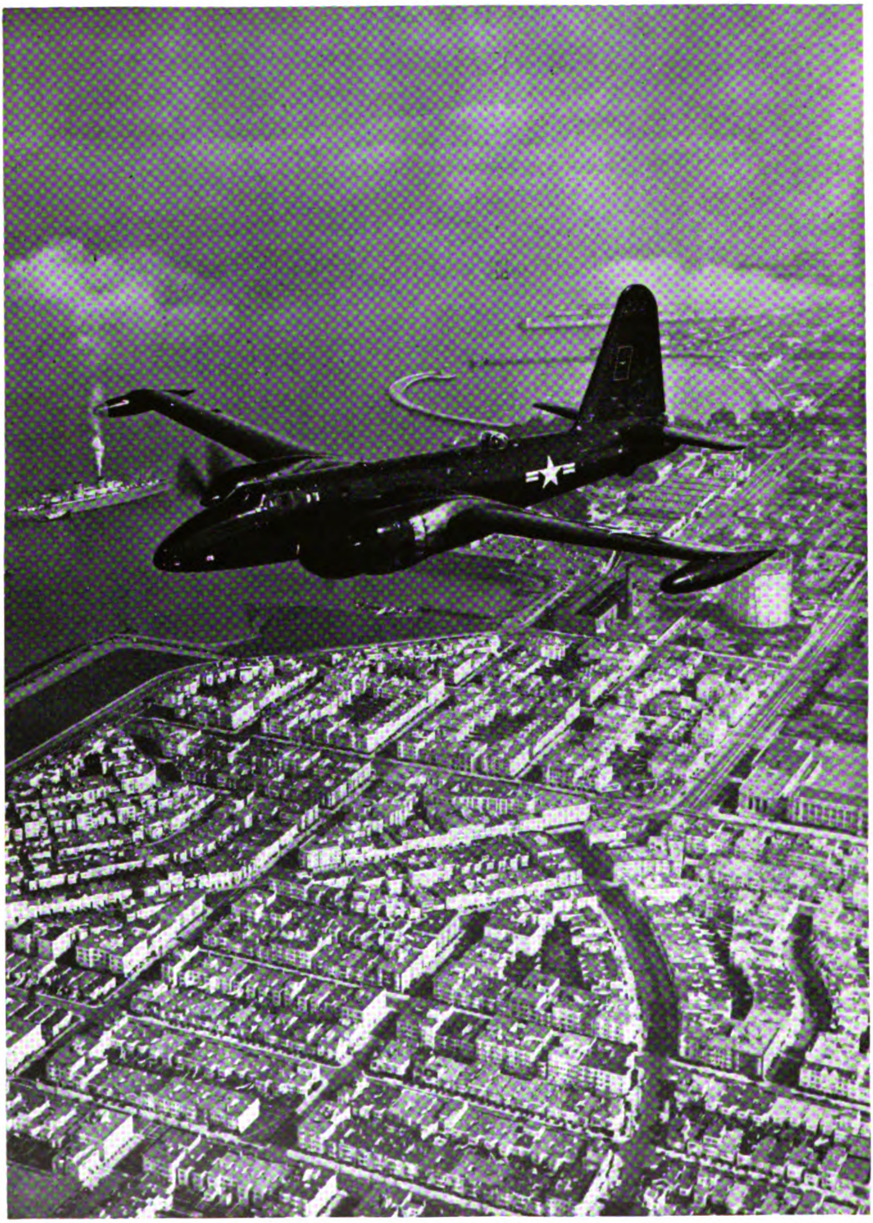
The members of this Committee were the Minister for Co-ordination of Defence, who was Chairman, and the three Service Ministers, with the Chiefs of Staff as advisers. Besides the Ministerial Committee on Military Co-ordination, there was also a Defence Committee of the War Cabinet.

The Chiefs of Staff Committee was a body of much longer standing. It originally comprised only the naval, land, and air Chiefs of Staff and was served by the Joint Planning and Joint Intelligence Staffs. According to the Warrant of Appointment drawn up in 1923,





(*a*) Boeing B.47 Stratojet Bomber
(*b*) Consolidated Vultee ("Convair") XC-99 military cargo–transport aircraft



Lockheed Neptune

> In addition to the functions of the Chiefs of Staff as advisers on questions of sea, land, or air policy respectively to their own Board or Council, each of the three Chiefs of Staff will have an individual and collective responsibility for advising on defence policy as a whole, the three constituting as it were a Super-Chief of a War Staff in commission.

This general language was sharpened and pointed by war-time terms of reference, which Mr. Chamberlain announced in the House of Commons on February 1, 1940, and which required the Chiefs of Staff Committee

> To advise the War Cabinet on any matter affecting or affected by the military aspect of the conduct of the war, and to investigate and consider in common all matters referred to the Committee by the War Cabinet.

As this language makes clear—and as Mr. Chamberlain emphasised in his statement on February 1, 1940—the existence of the Ministerial Committee on Military Co-ordination did not relieve the Chiefs of Staff Committee of their normal responsibility for advising the War Cabinet direct. All that changed was the technique of consideration; in Mr. Chamberlain's language, it was "sometimes found convenient for . . . reports [by the Chiefs of Staff Committee] to be referred to the Military Co-ordination Committee for detailed ministerial examination either before or after presentation to the War Cabinet."

The War Cabinet met for the first time on September 4, 1939. Thereafter it met daily, and often twice a day. Mr. Churchill describes it as "an earnest and workmanlike body," but remarks that its members were "hampered somewhat by the fact that they seldom sat together alone without secretaries or military experts." * Important work was done, it is true. One outstanding decision, which was reached after some division of opinion and a little delay, was that plans for land forces should be based upon the formation of a British Army ultimately totalling 55 divisions. Nevertheless, as an instrument for waging war the original War Cabinet and its subsidiaries were inadequate. An example of its weakness was the sorry tale of indecision and delay during the autumn and winter of 1939–40 over measures to prevent the passage through Norwegian territorial waters of the Swedish iron ore shipments which were vital to the German war economy. When hostilities against the Western Powers began in earnest with the German invasion of Norway and Denmark in the spring of 1940, this inadequacy became manifest and serious.

At the beginning of April 1940 it was clear that the office of Minister for the Co-ordination of Defence had become redundant, and the holder of this post (Admiral Lord Chatfield) therefore resigned. Arrangements were made instead for the First Lord of the Admiralty, as the senior service minister concerned, to preside over the Ministerial Committee on Military Co-ordination. At this time the First Lord was Mr. Churchill, who accordingly took the chair at the Committee's meetings, which were held daily and sometimes twice daily from April 8—when Germany invaded Norway and Denmark—to April 15. The course of events quickly became

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* Winston S. Churchill, *The Second World War.* Volume I: *The Gathering Storm* (London, 1948, Cassell), p. 355. A further comment of Mr. Churchill's is worth noting. He writes: ". . . the advantages of free discussion among men bound so closely together in a common task, without any formality and without any record being kept, are very great. Such meetings are an essential counterpart to the formal meetings where business is transacted and decisions are recorded for guidance and action. Both processes are indispensable to the handling of the most difficult affairs." *Ibid.*, pp. 355–6.

so violent that Mr. Churchill "soon perceived that only the authority of the Prime Minister could reign over the Military Co-ordination Committee."[*] On April 15 he therefore requested Mr. Chamberlain to take the chair, and it was Mr. Chamberlain who presided over practically all of the subsequent meetings of this Committee during the Norwegian campaign. But although "loyalty and goodwill were forthcoming from all concerned,"[†] the system of supreme direction remained highly unsatisfactory.

The faults were at several levels. Mr. Churchill has made them quite clear. First, at the technical level:

> Under the prevailing arrangement, the Chiefs of Staff worked as a separate and largely independent body without guidance or direction from the Prime Minister or any effective representative of the supreme executive power. Moreover, the leaders of the three Services had not yet got the conception of war as a whole, and were influenced unduly by the departmental outlook of their own Services.[‡]

Next, at the Ministerial Co-ordination Committee level. Here Mr. Churchill as First Lord took the chair and bore an exceptional measure of responsibility. But he had no power of effective direction. Among the other Service Ministers, who at this time were also members of the War Cabinet, he was only *primus inter pares*. He had no power to take or enforce decisions. He had to carry with him both the Service Ministers and their Chiefs of Staff. Nor could this Committee act itself. It was empowered only "to keep under . . . review" and "to make recommendations." The War Cabinet alone could authorise action. In other words, the ministerial body with closest and most detailed knowledge of the military side of the war had no power to decide anything. It could only pass on the difficult and delicate task of decision to another body, the War Cabinet, whose knowledge was necessarily less because the structure of organisation removed it farther from the facts. Finally, at all levels far too many bodies of able and important men—the Chiefs of Staff Committee, the Ministerial Military Co-ordination Committee, the Defence Committee of the War Cabinet, the War Cabinet itself—had either to be persuaded or else had the right and duty to express their own views.

Mr. Churchill has himself described how unsatisfactory were the proceedings of what he calls, even after Mr. Chamberlain took the chair at the Military Co-ordination Committee, "this fluid, friendly, but unfocused circle":

> The Chiefs of Staff sat daily together after discussing the whole situation with their respective Ministers. They then arrived at their own decisions, which obviously became of dominant importance. I learnt about these either from the First Sea Lord, who kept nothing from me, or by the various memoranda or *aides mémoires* which the Chiefs of Staff Committee issued. If I wished to question any of these opinions, I could of course raise them in the first instance at my Co-ordinating Committee, where the Chiefs of Staff, supported by their Departmental Ministers whom they usually carried along with them, were all present as individual members. There was a copious flow of polite conversation, at the end of which a tactful report was drawn up by the secretary in attendance and checked by the three Service Departments

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[*] *Op. cit.*, p. 464.
[†] *Ibid.*, p. 465.
[‡] *Ibid.*, p. 495.

> to make sure there were no discrepancies. Thus we had arrived at those broad, happy uplands where everything is settled for the greatest good of the greatest number by the common sense of most after the consultation of all."

Even this was far from the whole story. Mr. Churchill goes on:

> The Defence Committee of the War Cabinet sat almost every day to discuss the reports of the Military Co-ordination Committee and those of the Chiefs of Staff; and their conclusions or divergences were again referred to frequent Cabinets. All had to be explained and re-explained; and by the time this process was completed the whole scene had often changed.*

The difficulties, mistakes, and misfortunes of the Norwegian campaign quickly demonstrated how ineffective and unsatisfactory these arrangements were as an instrument for waging war. Mr. Chamberlain recognised spontaneously the urgent need for change. On May 1, 1940, he circulated a memorandum† describing modifications to be made forthwith in the Defence Organisation "in order to obtain a great concentration of the direction of the war." In essence, those changes increased the responsibilities, and to some extent the authority, of the First Lord of the Admiralty (Mr. Churchill). He was to continue to take the chair at all meetings of the Military Co-ordination Committee at which the Prime Minister did not preside himself. In the Prime Minister's absence he was to act as his deputy at such meetings on all matters delegated to the Committee by the War Cabinet. He was to be responsible on behalf of the Committee for giving guidance and direction to the Chiefs of Staff Committee, and for this purpose was empowered to summon that Committee for personal consultation whenever he thought necessary. And he was now to be assisted by a suitable central staff under a Senior Staff Officer, who himself became an additional full member of the Chiefs of Staff Committee.

To Mr. Churchill this arrangement "seemed an improvement." Certainly it began the process of focusing in appropriate ministerial hands the vital task of directing the work of the Service chiefs professionally responsible for military advice and policy. But the new arrangement also had serious weaknesses. Mr. Churchill describes them as follows:

> . . . the Chiefs of Staff were to a large extent made responsible to me in their collective capacity, and as a deputy of the Prime Minister I could nominally influence with authority their decisions and policies. On the other hand, it was only natural that their primary loyalties should be to their own Service Ministers, who would have been less than human if they had not felt some resentment at the delegation of a part of their authority to one of their colleagues. Moreover it was expressly laid down in [Mr. Chamberlain's] Memorandum that my responsibilities were to be discharged *on behalf of* the Military Co-ordination Committee. I was thus to have immense responsibilities, without effective power in my own hands to discharge them.‡

Although these arrangements lasted for only a week, they deserve careful consideration as an example of the great difficulty which civilian Cabinets find in adjusting methods which are customary and as a rule adequate during peace to the conditions of war and in surrendering and bringing to a focus the powers required to wage total war effectively. Mr.

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* *Op. cit.*, pp. 463–4.
† Printed by Mr. Churchill, *op. cit.*, pp. 506–7.
‡ *Op. cit.*, p. 507.

Churchill, with characteristic buoyancy, "had a feeling that he might be able to make the new organisation work." In fact, his own accession to the Premiership ten days later enabled him to establish a better one.

Under the new régime, ultimate responsibility for the conduct of the war continued to be vested in the War Cabinet. The composition of this body, however, was drastically altered. In deference to prevailing opinions expressed in Parliament and the press that Mr. Chamberlain's War Cabinet of nine was too large, Mr. Churchill began by having only five members. Besides himself as Prime Minister and Minister of Defence,* his War Cabinet at first included only Mr. Neville Chamberlain as Lord President of the Council, Mr. Clement Attlee as Lord Privy Seal, Lord Halifax as Foreign Secretary, and Mr. Arthur Greenwood as Minister without Portfolio. Later there was some increase in numbers and changes in personnel. At meetings of the War Cabinet other Ministers were usually present for convenience in the conduct of business, but it was on the members of the War Cabinet that all responsibility was laid.

The Ministerial Committee on Military Co-ordination had now become superfluous and was abolished. The Defence Committee of the War Cabinet continued. At the outset it comprised Mr. Churchill, Mr. Chamberlain, Mr. Attlee, and the three Service Ministers, with the Chiefs of Staff in attendance. Later on changes of a secondary character took place in its composition. In larger questions, or if there were differences of view, Mr. Churchill consulted the Defence Committee; but its formal meetings got fewer after 1941.†

Most important were the changes in the machinery of war direction. Mr. Churchill describes them as follows:

> The fundamental changes in the machinery of war direction were more real than apparent. . . . The existing organisms remained intact. No official personalities were changed. The War Cabinet and the Chiefs of Staff Committee at first continued to meet every day as they had done before. In calling myself, with the King's approval, Minister of Defence I had made no legal or constitutional change. I asked for no special powers either from the Crown or Parliament. It was, however, understood and accepted that I should assume the general direction of the war, subject to the support of the War Cabinet and of the House of Commons. The key-change which occurred on my taking over was of course the supervision and direction of the Chiefs of Staff Committee by a Minister of Defence with undefined powers. As this Minister was also the Prime Minister, he had all the rights inherent in that office, including very wide powers of selection and removal of all professional and political personages. Thus for the first time the Chiefs of Staff Committee assumed its due and proper place in direct daily contact with the executive head of the Government, and in accord with him had full control over the conduct of the war and the armed forces.
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> The position of the First Lord of the Admiralty and of the Secretaries of State for War and Air was decisively affected in fact though not in form. They were not members of the War Cabinet, nor did they attend the meetings of the Chiefs of Staff Committee. They remained entirely responsible for their departments, but rapidly and almost imperceptibly ceased to be responsible for the formulation of strategic plans and the day-to-day conduct of operations. These were settled by the Chiefs of Staff Committee acting

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* Mr. Churchill was also First Lord of the Treasury and, until 1941, Leader of the House of Commons as well.

† The Defence Committee's meetings numbered 40 in 1940, 76 in 1941, 20 in 1942, 14 in 1943, and 10 in 1944.

> directly under the Minister of Defence and Prime Minister, and thus with the authority of the War Cabinet. The three Service Ministers . . . organised and administered the ever-growing forces, and helped all they could. . . . They had the fullest information by virtue of their membership of the Defence Committee, and constant access to me. Their professional subordinates, the Chiefs of Staff, discussed everything with them and treated them with the utmost respect. But there was an integral direction of the war to which they loyally submitted. There never was an occasion when their powers were abrogated or challenged, and anyone in this circle could always speak his mind; but the actual war direction soon settled into a very few hands, and what had seemed so difficult before became much more simple—apart of course from Hitler. In spite of the turbulence of events and the many disasters we had to endure the machinery worked almost automatically, and one lived in a stream of coherent thought capable of being translated with great rapidity into executive action.*

Certain other changes were also made. In part they were needed to cope with the huge expansion of business caused by the world-wide spread of the war. One change was the establishment (by Mr. Chamberlain) of a Vice-Chiefs of Staff Committee to take some of the weight off the Chiefs of Staff. The Planning and Intelligence organisations were strengthened. In August 1940 Mr. Churchill took the only formal step of the kind that he ever found necessary, transferring the Joint Planning Committee from the Chiefs of Staff, under whom it had previously worked, his own control as Minister of Defence. This was done to give him direct access to and control of the Joint Planning Staffs and to help "in giving a vigorous and positive direction to the conduct of the war, and in overcoming the dead weight of inertia and delay which has so far led us to being forestalled on every occasion by the enemy." † The new arrangement did not alter the constitutional position of the Chiefs of Staff. Plans produced by the Joint Planning Committee were referred to the Chiefs of Staff Committee for their observations. Advice as to whether such plans or any variants of them should be adopted continued to rest with the Chiefs of Staff, who retained their collective responsibility for advising the War Cabinet. "In practice," Mr. Churchill writes, "the new procedure worked in an easy and agreeable manner, and I cannot recall any difficulties which arose."

All these changes did not mean that Mr. Churchill now conducted the war from day to day himself. The war, he told the House of Commons on February 24, 1942,

> is conducted from day to day, and in its future outlook, by the Chiefs of Staff Committee, namely, the First Sea Lord, the Chief of the Imperial General Staff, and the Chief of the Air Staff. These officers sit together every day, and often twice a day. They give executive directions and orders to the Commanders-in-Chief in the various theatres. They advise me, they advise the Defence Committee and the War Cabinet on large questions of war strategy and war policy."

The volume of work which the Chiefs of Staff Committee did alone is indicated by the fact that in 1941, out of 462 meetings held by the Committee, Mr. Churchill himself presided at only 44.

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* Winston S. Churchill, *The Second World War.* Volume II: *Their Finest Hour* (London, 1949, Cassell), pp. 15–16.

† Prime Minister's minute to Secretary of State for War (Mr. Eden) dated 30.VIII.40: *Their Finest Hour*, p. 221.

Nevertheless, Mr. Churchill's own methods of working were obviously of great importance. He describes them thus:

> When I woke at about 8 a.m. I read all the telegrams, and from my bed dictated a continuous flow of minutes and directives to the departments and to the Chiefs of Staff Committee. These were typed in relays as they were done, and handed at once to General Ismay, Deputy Secretary (Military) to the War Cabinet, and my representative on the Chiefs of Staff Committee, who came to see me early each morning. Thus he usually had a good deal in writing to bring before the Chiefs of Staff Committee when they met at ten-thirty. They gave all consideration to my views at the same time as they discussed the general situation. Thus between three and five o'clock in the afternoon, unless there were some difficulties between us requiring further consultation, there was ready a whole series of orders and telegrams sent by me or by the Chiefs of Staff and agreed between us, usually giving all the decisions immediately required.*

Also of the highest importance were the personnel and stability of the Chiefs of Staff Committee and the central Defence staff. A few changes took place in the early days; thereafter, for nearly four years after 1941, the only change in this small, closely knit group at the centre of the war direction was due to the death in harness of the First Sea Lord, Admiral Pound.

In this supreme directing organisation the relations for better or worse between the political head and the Service chiefs could clearly make or mar the whole. Actually, they could not have been better. Here is Mr. Churchill's account of this vital matter:

> I cannot say that we never differed among ourselves even at home, but a kind of understanding grew up between me and the British Chiefs of Staff that we should convince and persuade rather than try to overrule each other. This was of course helped by the fact that we spoke the same technical language and possessed a large common body of military doctrine and war experience. In this ever-changing scene we moved as one, and the War Cabinet clothed us with ever more discretion, and sustained us with unwearied and unflinching constancy.*

No more remarkable achievement of its kind is recorded in the long history of war.

The early achievement of a supreme war direction of superlative excellence was a major British advantage in World War II. Many lessons had been learnt from the experience of World War I, many mistakes made twenty-five years earlier were wholly avoided. The General Staff was not practically dispersed at the outset and sent to France with the Expeditionary Force, as in 1914. At the beginning of World War I the Admiralty and War Office Staffs were not in close and daily contact, nor was there any machinery for joint planning. In World War II the Chiefs of Staff Committee and the Joint Planning Staff existed from the start. Even in 1939 the arrangements at Cabinet level were far superior to those in 1914; the number of ministers concerned was smaller, responsibility was more concentrated, and administrative arrangements were vastly better. The 1914 Cabinet had no agenda paper, no secretary, and no records; ministers sometimes misapprehended the decisions reached; and the Admiralty and War Office Staffs often did not know what had been decided or what action they had to take. In 1939 the strength and efficiency of the War Cabinet were outstanding.

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* *Their Finest Hour*, p. 17.

† *Ibid.*, p. 20.

In the United States the supreme war direction was also small and concentrated, and between statesmen and fighting men in this central group harmonious relations prevailed. The constitutional position of the President as Commander-in-Chief, together with the world-wide scale and vast complexity of the war, made essential a central executive agency for co-ordinating the American military effort. The organisational problem was solved by the establishment of the Joint Chiefs of Staff, who became the President's direct military advisers, and whose creation as a formal body resulted largely from the far-sighted and selfless advocacy of General George C. Marshall. Here too personalities did not change, relations were stable, and control was firm. All this contributed incalculably to the adoption of sound strategic decisions and to tenacious adherence to them. A similar co-ordination and unification of Anglo-American strategy as a whole was achieved by the establishment of the Anglo-American Combined Chiefs of Staff early in 1942. On the work of this body General Marshall wrote in his Biennial Report for 1941–43 that "probably no other Allied action, in the field or otherwise, has exerted as powerful an effect on the conduct of this war as the prompt establishment of a prescribed procedure for achieving unity of effort through the medium of the Chiefs of Staff acting under the direction of the leaders of their respective governments." The *sine qua non* for the successful work of the Combined Chiefs of Staff was of course the inflexible determination of Mr. Churchill and President Roosevelt to fight the war as a unified team.

In Germany the situation was very different. Hitler demanded slave-like obedience and subordination from his generals, grossly overrated his own abilities, and as grossly underrated the technical, organisational, strategic, and even tactical problems of the war from the German standpoint. He failed to achieve co-ordination between the three German Fighting Services—a failure from which very serious consequences flowed. He did not even achieve the essential minimum of strategic co-ordination between Germany and the other Axis Powers. As is now well known, his arrogance, suspicion, constant and unwarrantable interference in detail, and gigantic mistakes in major policy contributed more than the action of any other German to procure his country's defeat.* All this may well be acknowledged without giving countenance to a legend that but for Hitler the German General Staff might have won the war.

A good supreme war direction requires both the right organisation and the right men. The organisation must be compact, united, flexible, and effective both in deliberation and in action. Difficult organisational problems must be solved; in particular, the supreme direction must not be over-centralised or else a flood of detail will hamper vision, paralyse decision, and stifle effort. Far more difficult is the choice of men. In earlier and smaller societies the heads of states and governments in troublous times rarely if ever won or maintained their positions unless they were successful in war. In the complex modern world specialisation has largely divorced the statesman and the fighting man, and the road to professional military eminence is rarely travelled by those who mount the heights of supreme political power. Nevertheless, essentials have not changed. More than ever statesmen and fighting men must understand each other's problems—and for effectiveness in war the main burden of achieving that understanding must be borne by statesmen. For in the supreme direction as elsewhere in war's tempestuous story the final problems are not material but moral.

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* Major-General von Lossberg's recently published memoirs, despite obvious personal bias, add further valuable details to earlier disclosures about Hitler's relations with the German Supreme Command and his conduct of the war. He reports Hitler as wanting, in his own words, generals "who tugged like hounds on the lead for the moment when they could throw themselves on their prey"—not exactly the best attitude for achieving the carefully weighed decisions which, amongst other things, modern war requires. Lossberg was a member of the Operations Staff of the *Wehrmacht* until December 1941. See Bernhard von Lossberg, *Im Wehrmachtführungsstab* (Hamburg, 1949, H. H. Nölke Verlag), p. 15 and *passim*.

JULES MENKEN

POSTSCRIPT. Fleet Admiral William D. Leahy's memoirs (*I Was There*: London, 1950, Gollancz) give additional information about the functioning of the American Supreme Command during the Second World War. Admiral Leahy was Chief of Staff to President Roosevelt as Commander-in-Chief of the United States Army and Navy, and served President Truman in the same capacity. His duties in this post (of which he was the first holder) began on July 20, 1942, and terminated on March 21, 1949. The topmost military organ of the American war direction was the Joint Chiefs of Staff, which descended from a Joint Army and Navy Board dating back to 1903. President Roosevelt had this Joint Board placed under his direction in 1939, and assigned many tasks to it. The Joint Chiefs of Staff, which held its first meeting in February 1942, absorbed the functions of the Joint Board, and became the principal American agency for Army–Navy–Air Force co-ordination. The other war-time members were General George C. Marshall, Chief of Staff of the United States Army; Admiral Ernest J. King, Commander-in-Chief United States Fleet and Chief of Naval Operations; and General H. H. Arnold, Commanding General, United States Army Air Forces. When Admiral Leahy took up his duties in July 1942, General Walter Bedell Smith was secretary. As senior officer present, Admiral Leahy took the chair at meetings, prepared the agenda, and signed all major papers and decisions. The Joint Chiefs of Staff was an instrument of the President as Commander-in-Chief, and was responsible to him. The Joint Chiefs of Staff kept President Roosevelt informed on military strategy, the man-power requirements of the armed forces, the production and allocation of munitions, and all other joint Army–Navy policy matters. Its more important subsidiary bodies included the Joint Deputy Chiefs of Staff, the Joint Secretariat, the Joint Staff Planners (which had a highly important sub-committee called the Joint War Plans Committee), the Joint Intelligence Committee (which included a representative of the Office of Strategic Services and the Board of Economic Warfare), and the Joint Psychological Warfare Committee (whose director was the head of the O.S.S.). During the period which ended with the surrender of Japan the Joint Chiefs considered 1,457 separate subjects, the scale of documentary treatment ranging from a single paragraph to the length of a small novel. Admiral Leahy writes (pp. 127–8): "Planning of the major campaigns always was done in close co-operation with the President. Frequently we had sessions in his study. . . . The policy and broad objective were stated by the President; the provisions for transportation, allocation of equipment and munitions were fixed by the J.C.S.; but all details of operations were left to the area commanders. . . . Throughout the war the four of us—Marshall, King, Arnold, and myself—worked in the closest possible harmony."

CHAPTER VIII

COMMONWEALTH CO-OPERATION IN THE SERVICES

Of the many lessons which the last war taught, none was so vital or so far-reaching as that of co-operation. It stretched in every direction, as much between the nations as between the Services and, indeed, between individuals, and its impact brought about a new conception of the obligations of defence in modern war.

The wartime pattern was, in fact, more than mere co-operation. It came much closer to integration, a merging of national forces into a single whole, flexible enough to undertake the whole burden of global war and to prosecute it throughout with a steady eye always on the main chance. National susceptibilities were largely submerged by the international need, and on the whole the overall *desiderata* of a single armed force, working smoothly together in all parts of the world and united towards one common end, was very largely achieved.

What is possible in war, however, may not always be achieved in peace. National pride and considerations of national prestige rise again and there is no longer the wartime spur of self-preservation to force the abolition of national prejudices for the common good. The tendency is always to revert to the original *status quo* and to lose sight of the common international goal in the nearer view of a local requirement.

The sharp and painful lesson of six years of war has not, however, been so entirely forgotten yet as to cause the great international weapon, forged between 1939 and 1945, entirely to disintegrate. There is no longer an integral force, it is true, and in the first flush of victory in 1945 there was, perhaps, a tendency among individual countries to withdraw into their national shells and to speed the return to peace with a too rapid demobilisation and disarmament and an inclination to forget the obligations of defence beyond their immediate borders. But the habit of co-operation and the exchange of views and ideas remained.

So far as the British Commonwealth of Nations is concerned, there has been a reasonably large volume of co-operation since the war in all branches of the Services, not so intimate as during the war, of course, and perhaps not so close as could be wished by those who have the ability to think internationally and who can appreciate how quickly a regional danger can develop into a global one. There is a tendency in Great Britain, too, sometimes to forget that the Dominions are no longer colonies and that they are, in practice and fact, completely independent nations. They may be our "cousins across the water," but an Australian, for instance, knows himself to be an Australian *before* he thinks of himself as a citizen of the Empire, and in his eyes Australian defence needs and difficulties must inevitably loom larger than those which confront the other partners of Empire. The same state of affairs is natural throughout the Commonwealth, and Great Britain herself is no exception though, perhaps, her greater political maturity enables her to cast her eye on a wider field.

Before one can look more closely into the details of defence co-operation which exist between the various Commonwealth nations, there is one aspect of the problem which needs mention and some degree of examination. During the last war the United States, by reason of her overwhelming productive capacity, became the dominant partner in the military machine, and her post-war abandonment of the previous policy of isolation gives her the same position in the present years of peace. There is a close and ever-increasing co-operation between the defence forces of Great Britain and the United States, which extends as well to what may be called the auxiliary services of military practice, such as intelligence, training, supply, etc.; and in some respects this means that the requirements of British-U.S. co-operation must inevitably be placed before those of this country with the Dominions.

A further difficulty in this overall picture of international co-operation arises from problems of standardisation. An ideal state of affairs is naturally one in which the material of modern war is built to a standard international specification, so that its construction, its servicing, the supply of spare parts, etc., can be co-ordinated to fit into normal procedures of commercial productive capacity. Here again the overwhelming weight of American industrial capacity complicates the Empire picture, for United States standards vary in many respects from British and Dominion. If war should come again, it must still largely be to the United States that the nations of the British Empire and of the democratic world must look for the adequate quantities of the actual weapons of war. Yet standardisation on the American pattern would entail the scrapping and rebuilding of a large proportion of British and Dominion industry, a state of affairs that the national economies of those countries could not contemplate. In this field there is a natural reluctance to press on towards full industrial co-operation as between Great Britain and the Empire countries until some *modus vivendi* between American and British standards has been reached. A committee on standardisation has been set up in an attempt to reach a rational solution of this problem, but it is one which bristles with difficulties and which, until it is satisfactorily resolved, retards the material co-operation which is so desirable a factor in Imperial defence.

Standardisation, however, extends to other fields than the material and discussions have been taking place with a view to agreeing on a common system of training and operational techniques, communications procedure, classification and handling of stores, and so on. These discussions have been carried out with United States authorities as well as with those of the Dominions.

Broadly speaking, the present system of Empire co-operation is based on the appointment of Dominion Service liaison officers attached to the staffs of the High Commissioners. They have access to and frequently work in partnership with officers of the three Services in this country. At the same time, British liaison officers are attached to the headquarters staffs of the Dominion Services, so that problems in efficient co-operation which arise from either end can be tackled on the spot. The exchange of Service information, of methods of training and procedure, of new research and development, of new techniques, is largely carried out by means of these reciprocal appointments. The system is fortified by the permanent Joint Services Mission established in Washington to keep closely in touch with American military thought and procedure, and by the contact it maintains there with the Chiefs of Staff Committee. All the Dominions are represented on the Services side in Washington.

In addition to the exchange of liaison officers, a further method of co-ordinating Service practice is by the exchange of officers and men, a procedure which fosters understanding as well as Service co-operation. It is a scheme that in the past was open to some criticism on the grounds that the quality of the personnel selected was not of the best—certainly some unfortunate appointments were made—but much greater care is now exercised in selection and only those who are likely to achieve a closer Imperial relationship are chosen for exchange visits. Service and inter-Service Staff Colleges are other means of furthering Dominion co-operation, a method achieved by the appointment of Dominion officers to British Staff Colleges and vice versa.

A more specialised method of making known existing military techniques is by the appointment of observers from the Dominion forces to attend specific exercises carried out in Great Britain and of British observers for those in the Dominions. These officers report back to their respective Chiefs of Staff on the conduct of the exercises, the lessons learned, the difficulties overcome, the individual techniques employed, etc. Thus, to the broad flow of Service information maintained by the permanent liaison officers, there is added the specialised information learned by critical observation in large- and small-scale manœuvres, in staff exercises and discussions, and so on.

It is, perhaps, unfortunate that economic considerations cut very heavily into the ideal method of Imperial co-operation, that of combined exercises in which units of the various Dominion defence forces join with those of the home country. The value of actual physical co-operation in battle exercises must far outweigh the fruits of liaison, no matter how close, for it is in the actual physical contact that the most vivid lessons are learned. Necessary financial economy has, unfortunately, prevented the holding of frequent large-scale exercises where British and Dominion forces could join in manœuvres designed to smooth out differences of procedure and technique which inevitably exist as between the various nations. A strict and relentless Treasury enforces economy in fuel, ammunition, and other expendable stores, to an extent where only the fringes of the problem can be adequately met. Small-scale participation has occasionally been possible, but even this is becoming more difficult as the economic stringency grows.

AUSTRALIA

Closer naval relations between Australia and Great Britain should be enhanced by the recruitment in the United Kingdom of over 1,000 ex-R.N. ratings for service in Australian ships. In addition, over 650 Australian officers and men were brought to Great Britain for naval aviation courses before the commissioning of H.M.S. Terrible as H.M.A.S. Sydney, Australia's first carrier. This acquisition of a British carrier, of British cruisers, and of Australian-built bestroyers to the British 'Battle' and 'Daring' classes ensures that the ships of the Royal Australian Navy conform to the best elements of British naval design and are thus largely interchangeable in cases of emergency or replacement without loss of efficiency. The Federal Government in 1949 accepted an Admiralty offer to base three

British submarines on H.M.A.S. Penguin, at Balmoral, Sydney, to assist officers and ratings of the Royal Australian and Royal New Zealand navies to obtain adequate training in anti-submarine work. Two of them, H.M.S. Telemachus and H.M.S. Thorough, had already arrived early in 1950 and a third was to follow shortly.

The Army Staff College at Queenscliff, Victoria, has extended its training facilities to other countries and in the present course are two representatives from Great Britain, one from Canada and one from Pakistan. Under reciprocal arrangements Australia has sent three representatives to England for training at Camberley, one to Canada for training at Kingston, and one to Pakistan for training at Quetta.

The Commonwealth Government are building British types of jet aircraft, the Hawker N.7 fighter and a twin-jet bomber still on the secret list in Great Britain. Australian-built 'Vampires' also keep the R.A.A.F. in line with British types. Others in operational use are 'Lincolns' and 'Mustangs.' The first R.A.A.F. Staff College was opened in 1949 and the training is being kept exactly at the same level as at the R.A.F. Staff College, Bracknell, by sending two officers from Australia to Bracknell each year. Large-scale recruitment in Great Britain for the ground staff for the R.A.A.F. is also in progress.

CANADA

A statement in the Canadian House of Commons by Mr. B. Claxton, Minister of National Defence, stressed the fact that, referring to Great Britain and the United States, it was in Canada's interest to have the maximum co-operation with the forces of both countries. "We have," he said, "interchanges of information, staff, training officers, equipment, designs, and so forth. These arrangements are, I believe, entirely satisfactory to all concerned."

Two Canadian ships, the British-built carrier Magnificent and the destroyer Micmac, took part in a large-scale American exercise in the Caribbean early in 1950, known as "Operation Portrex." Included also were H.M. Ships Glasgow, Snipe, and Sparrow, the British and Canadian contingent being under the command of Vice-Admiral Symonds-Tayler, C.-in-C., America and West Indies Station. On the conclusion of the exercise, British, Canadian, and American ships joined forces for training manœuvres, given the code name "Caribex 50."

H.M. Submarine Astute has been lent to the Royal Canadian Navy and R.C.A.F. for anti-submarine training. She is taking part in a series of exercises in conjunction with aircraft from H.M.C.S. Magnificent and the R.C.N. air station at Dartmouth, Nova Scotia.

The interchange arrangements for officers between the British and Canadian navies has been temporarily suspended because of a complaint by Canadian seamen that officers were returning with "phoney English accents." It seems a pity that this was allowed to interfere with a practice which was of mutual value to both navies in the sphere of co-operation.

A Canadian general, Lieut.-General G. G. Simonds, recently completed a two-year appointment as an Army instructor at the Imperial Defence College in England. Major-General J. F. M. Whiteley, from Great Britain, at the same time completed a similar appointment as Commandant of the National Defence College and Canadian Army Staff College at Kingston, Ontario. There was a series of short liaison visits by senior British officers to Canada during 1949, those visiting the Dominion including the Directors of Artillery, Fighting Vehicles, Military Intelligence, and the Royal Armoured Corps. Arrangements have also been made between the defence authorities of Canada and Britain to continue for a further two years from 1949 the well-established scheme under which Army officers of each country serve in the training establishments of the other.

The Royal Canadian Air Force has instituted a regular series of liaison visits to Great Britain for R.C.A.F. personnel, and instructors from the Central Flying School in Ontario visited R.A.F. Flying Training establishments during 1949 and 1950. Co-operation between the R.A.F. and the R.C.A.F. has always been of the closest, built on the firm foundation of the Empire training scheme in which so many R.A.F. personnel received their initial training in Canada.

CEYLON

The armed forces of the new Dominion of Ceylon are still very much in embryo. At the request of the Prime Minister of Ceylon, Mr. Senanayake, naval, military, and air force advisers have been appointed from the U.K. to superintend the building up of the Cingalese forces. In addition, ten cadets have been sent to Sandhurst for training.

INDIA

The Indian naval forces are made up of ex-British ships, with the cruiser Delhi, formerly H.M.S. Achilles, as the flagship of the Royal Indian Navy. A close relationship exists with the East Indies Squadron of the Royal Navy, which may in time lead to the absorption of the functions and duties of that squadron by the R.I.N. A number of senior British officers have been lent to India for training duties. In company with cadets from other Dominions, some from India have been included during recent cruises in the complement of the training cruiser Devonshire.

There are still a number of British officers serving in the Indian army, though ultimately they will all be replaced as soon as Indian officers are trained in sufficient numbers. In the meantime they are passing on Western military ideas to the new generation of Indian officers who are under training. A number of Indian officers are included in the courses at the Joint Services Staff College in England.

Air Vice-Marshal Mukerjee, Deputy Chief of Staff of the Indian Air Force, was trained at Cranwell, an indication that a close liaison with the Royal Air Force will be maintained. The new training centre near Jalahalli, Bangalore, is being set up on British lines and the staff is chiefly British. The "all-through" training system of the R.A.F. has been introduced into the Indian Air Force at their colleges at Jodhpur and Ambala.

NEW ZEALAND

To further the exchange of naval technique and information, two New Zealand frigates, the Taupo and Howeo, have been transferred for six months to the Mediterranean Fleet, their place in the New Zealand Navy being taken by two frigates from the Mediterranean, the St. Austell Bay and Veryan Bay. The three British submarines based at Sydney to assist Australian ships in anti-submarine exercises are equally available to New Zealand ships.

The New Zealand Air Force is represented on the instructing staff and in the courses of the new R.A.F. Flying College at Manby, Lincolnshire, which gives selected officers practical instruction and experience in a combined course of flying, navigation, and the use of weapons in all weather conditions.

PAKISTAN

A large-scale combined operations exercise was carried out at the Staff College, Quetta, during 1949, in which H.M.S. Mauritius represented the Royal Navy. A number of officers and ratings of the Pakistan navy have attended instructional schools in Great Britain on their visit to this country to take over British destroyers and frigates for the Royal Pakistan Navy.

The Pakistan military academy at Kabul, near Abbottabad, under the command of Brigadier Ingall, is largely organised on British lines and forms an active link for the promulgation of current military techniques in which British-Pakistani co-operation would be available.

Air Vice-Marshall R. L. R. Acherley is in command of the Pakistani Air Force. Inter-Dominion training, in which cadets from Pakistan take part, is carried out at the Empire Test Pilots School at Farnborough. The Royal Air Force has undertaken to train 500 Pakistani aircraft apprentices for the Royal Pakistan Air Force over the next few years. They are being trained at Halton and Cranwell and the first entry of 39 is now under instruction. The technical training college at Karachi has Air-Commodore R. E. Vernon as its principal.

UNION OF SOUTH AFRICA

Visits to South Africa by units of the Home Fleet and by ships of other squadrons have been used as occasions for joint exercises with the South African Naval Forces.

A close liaison with the Union Defence Force exists for the exchange of Army information, both technical and administrative. The South African Air Force have adopted the 'Vampire V' as their ground-attack fighter, thus bringing itself into line with the Royal Air Force in this country. The aircraft are being built and equipped to full R.A.F. standards.

P. K. Kemp

CHAPTER IX

STANDARDISATION OF FIGHTING EQUIPMENT

WHENEVER NATIONS are allied in defence or war, and it applies particularly in this highly mechanised age, the advantages of common equipment among them have been obvious; yet the attainment of any degree of standardisation has still to be achieved. A major move has, however, now been made towards this desirable end with the tripartite agreement for collaboration in military standardisation among the armed forces of the United States, the United Kingdom, and Canada. It promises that in time of necessity there will be no material or technical obstacles to full co-operation among the armed forces concerned; but as yet this means little more than that a policy has been arrived at on the subject. Officers are being exchanged between the three States in order that they may be familiar with the problems involved: ultimately this should lead to a gradual development of unified equipment and training methods.

Those who have investigated the subject are agreed on its great complexity when the possibility of complete standardisation is envisaged; but some aspects of it readily offer scope, particularly when they are concerned with expendable items that can be modified and unified during their production. Yet in the most obviously desirable cases, such as the calibres of artillery and small arms, the expense of conversion and the problems of organisation and training in order to introduce conformity might easily be too great for general acceptance. This, however, is one of the many "confidential" aspects of military standardisation that cannot for security reasons be enlarged upon here. Nor is it surprising that the Services concerned are reluctant to discuss the subject, because it is usual, even when nations are working together, to observe a discreet silence on these matters: they do not publish their views to the world.

In the past there has been a good case for the diversification of fighting equipment and techniques even among Allies; but the turn of events since the end of World War II—the line-up of nations either side of a metaphorical "iron curtain" and the determination of the two great camps to foster their ideals—has made the international coordination of defence a corner-stone of self-preservation. In these circumstances the value of standardised equipment in the forces of the free nations represents a great economy in their joint effort towards a fully integrated fighting service.

While the advantages would be largely administrative, there are also strategic and tactical benefits to be gained from the acceptance of standard fighting equipment and materials of war. Fortunately military standardisation is not a device that loses all significance unless it is complete: the process is essentially progressive, for every item that becomes standardised, whether it be large or small, complex or simple, marks a distinct and useful step in the right direction.

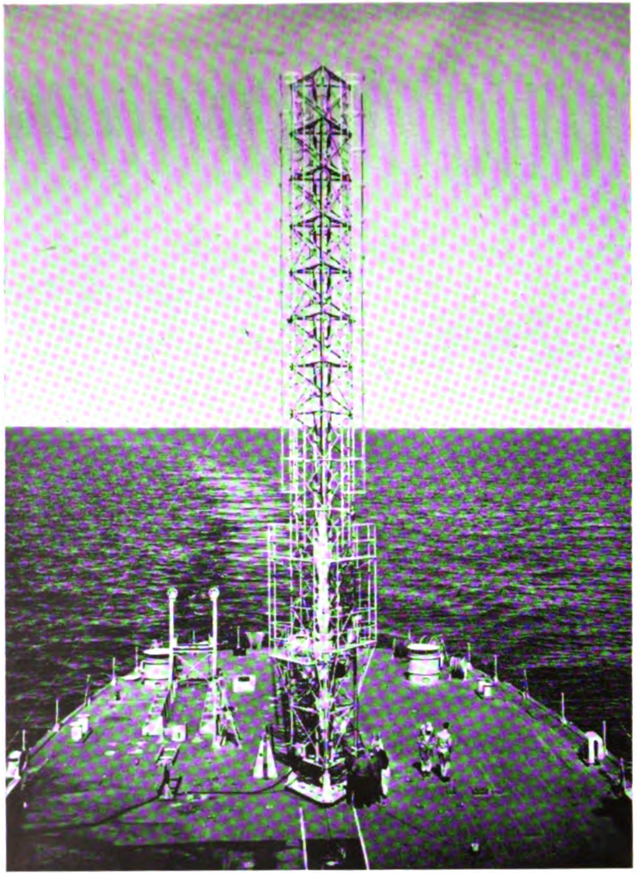
Perhaps the greatest problem to be overcome in the standardisation of purely military equipment is the fact that so much of it depends on the production techniques and machinery used for the manufacture of goods needed by the civil population; thus in many cases military standardisation would have to be preceded by civilian standardisation. We have an example in the British fighter aircraft, which have been adopted by several countries as the standard fighter aircraft for the defence of Europe. Here is a measure of international standardisation involving the aircraft, the training of air-crews, procedure, maintenance and the provision of spare parts; but from the engineering point of view it is largely a standardisation of British civil production techniques. Even where licences have been granted for the manufacture of the fighters abroad it has meant the importation of standards different from those used in the particular country, and in the true sense it is no standardisation at all.

PROGRESS ALREADY MADE

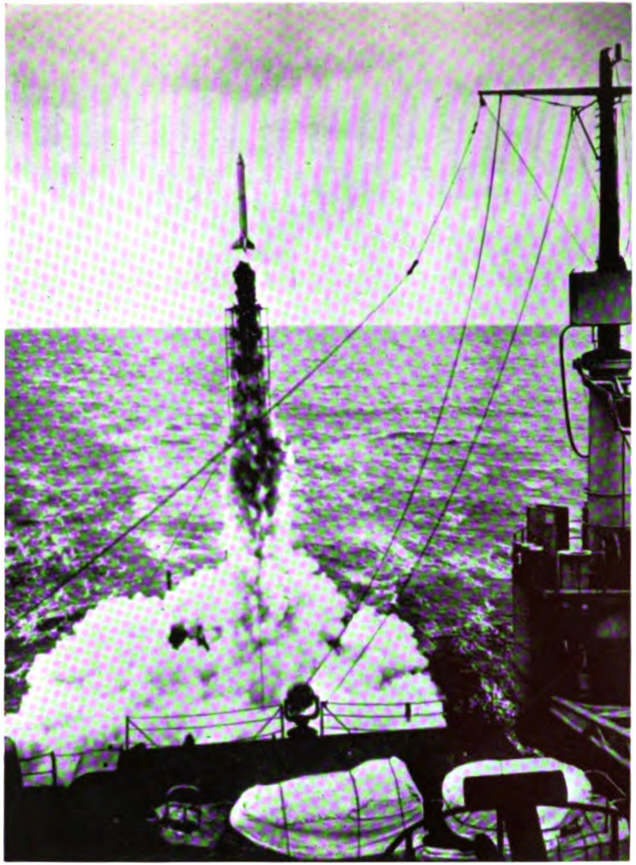
Work on standardisation has been going on in Great Britain, the United States, and Canada for three years, and although much of it has been of an "academic" character (and some has been concerned with aspects of the subject that cannot be discussed here), with an agreement reached on a unified thread system, we have the first-fruits of intelligent compromise. Nothing could be of more fundamental significance in the vast and complicated machines of war than the nuts and bolts that hold the parts together. Indeed, it is surprising that the science of engineering, which knew no national boundaries during its swift expansion in the nineteenth century, allowed the introduction of incidental difficulties when the enlarging field of knowledge and practice engaged the attention of the best and most creative minds. Nevertheless, the Americans—seeking rather to produce a difference than an improvement—standardised a thread form that varied only minutely and non-essentially from the system proposed some years earlier by Sir Joseph Whitworth and adopted generally by British engineers. Apart from the threads, small differences exist on a number of the fundamental dimensions that characterise bolts, nuts, and screws, and these remain to be agreed at some future time.

The adoption of a unified thread system, which will allow America, Britain, and Canada to undo the folly of the past, is an achievement itself; it also serves as an excellent example of international cooperation which will be necessary again and again if complete standardisation—which will probably never be reached—is recognised as the ultimate goal. In this connection it should be recalled that the negotiating bodies representing the three countries, brought together by hard problems and common interests arising from the war with Germany and Japan, had three broad alternatives before them once it was accepted that standardisation was necessary and attainable. Either one of the two existing national standards might be adopted by all, or a new and better system might be introduced if that were possible.

It is at once apparent to a dispassionate mind that a new system has nothing to recommend it unless it is in fact better; and, failing a better system, one of the national standards ought to be chosen. The approach was, fortunately, both dispassionate and logical: first inquiry was made regarding a possible thread system, but none was found; then practical tests were made to see if one of the two national systems was better than the other, and they were found to be equal in all respects but one—the round

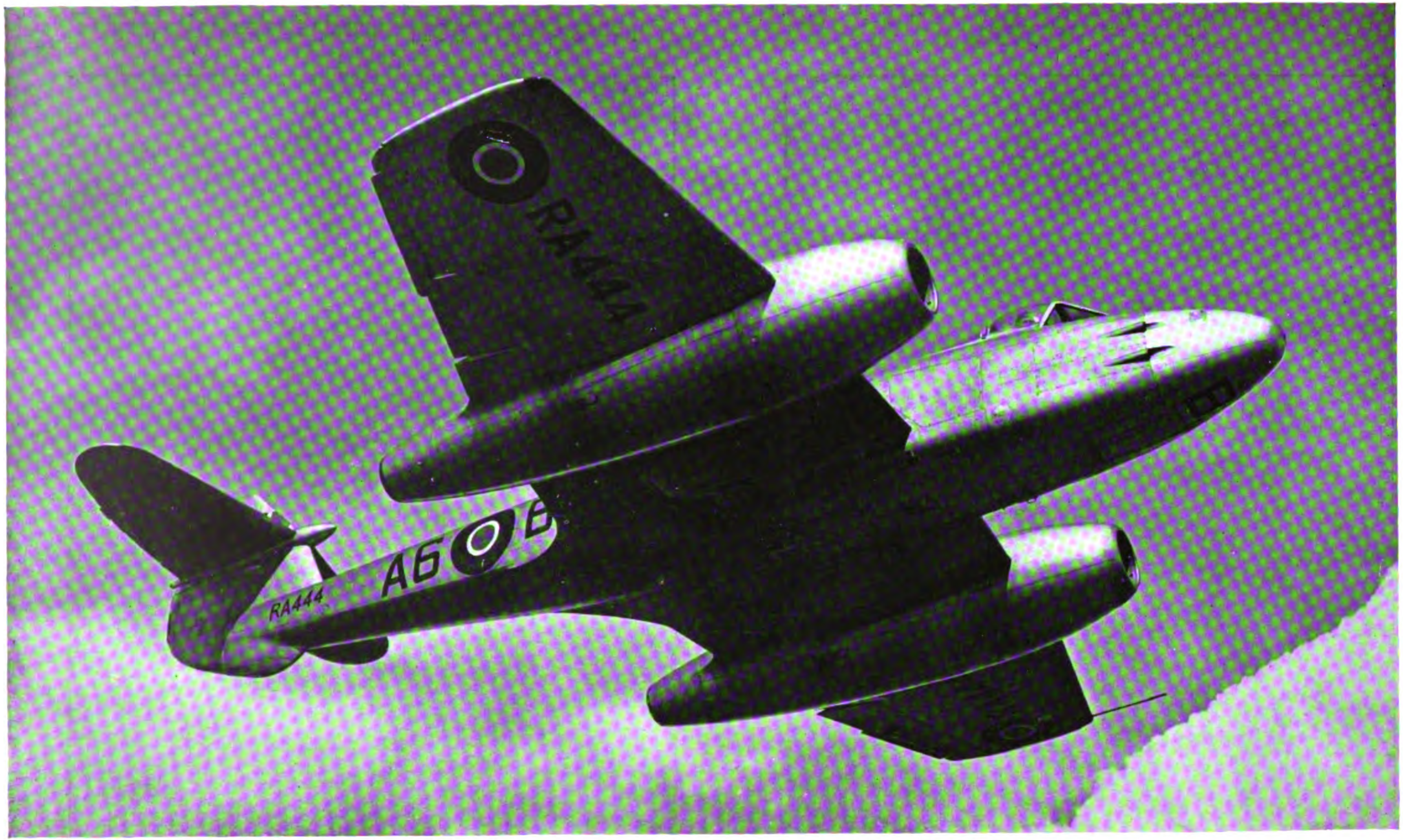


Rocket Launching Frame. U.S.S. Norton Sound



Rocket leaving Frame

Associated Press photographs



Gloster Meteor 4

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root (the base of the V-thread form) of the Whitworth thread gave it a superior performance to the flat-rooted U.S. thread when both were subjected to fatigue tests.

This advantage possessed by the Whitworth form could not determine the choice of thread system, since a very small modification would remedy the only fault found in the American. As a result there was an even contest between the American thread, modified by the adoption of a rounded root, and the British or Whitworth thread. Someone had to give way, and, perhaps to our honour, it was the British. Perhaps, on the other hand, it was simply a matter of the larger interest overruling a minority; but it can hardly be disputed that an existing national standard is to be preferred to compromise—just as either English, French, or Spanish would make a better world language than Esperanto. It happens that there is one flaw in the agreement: one point upon which the Americans compromised and spoilt the principle that the unified thread is a slightly modified U.S. thread, completely interchangeable with the older flat-rooted version. This compromise concerns the half-inch diameter thread in the coarse series, the only diameter on which the original British and American systems failed to agree on the pitch or number of threads to the inch for the half-inch diameter. The unified system has accepted twelve threads to the inch (the Americans prefer 13), but as the thread angle is 60 deg. instead of Whitworth's 55 deg. the concession is of no value to Britain and introduces an unnecessary change in U.S. practice. Perhaps the British Standards Institution should tell the Americans that we would just as soon unify on a basis of 13 threads as 12 to the inch.

Thus is thread unification complete over the whole range of sizes from quarter-inch diameter upwards, and detailed specifications of the Unified Thread series are published by the British Standards Institution in *B.S.* 1580–1949. National differences have been completely swept away, and, though it is true that within the latitude allowed to makers in both countries the Americans may be expected to prefer a flat crest (as opposed to the base of the V-thread formation) and the British a rounded crest, this is immaterial, for both types are true Unified Threads. Moreover, it now appears that contact between engineers on both sides of the Atlantic has led to a better appreciation of the reasons for the American preference for a flat crest and the British love of a radius.

VEHICLES

We have considered one aspect of standardisation, which has had a successful outcome as a result of intelligent cooperation between contending national interests; but there is a purely domestic side to the problem. As a result of experience gained during the last war general specification has been drawn up by the Ministry of Supply defining the performance and other desirable characteristics which should be incorporated in wheeled vehicles designed *ab initio* to meet all British Service requirements.

The essential difference of these vehicles from civilian types lies in their ability to operate off the roads with and without a towed load, which calls for an exceptionally high power-to-weight ratio for the towing vehicle. There are indications that this ability will in future be required in a greater measure than ever before, irrespective of size and type. Service vehicles must also be easily waterproofed for wading and must be able to operate in climatic extremes from great cold to intense heat. Not only must the mechanical problems be overcome; the crew, and passengers if any, must be protected from extremes of temperature. In medium and light vehicles air-portability is likely to be an important consideration. In order to enter and fly in military aircraft both the external dimensions and the gross weight of vehicles must be rigidly restricted.

When commercial vehicles are adopted for military use their shortcomings in respect of Service specifications are, of course, recognised and their applications restricted. It would be of great benefit to the defence of the country (the Ministry of Supply points out) if new designs of commercial vehicles incorporated as far as possible the features which are essential to military vehicles. Thus we have another perfectly reasonable conflict of interests between civil and Service needs; even if they were partly integrated the result would provide a degree of standardisation not wholly in favour of military requirements.

The first aim for Service vehicles, and the one which is chiefly responsible for the divergence of military and civilian vehicle design, is good performance off the road. This can be achieved only by a combination of qualities some of which are mutually conflicting: the vehicle should be able to travel fast over heavy ground and accelerate extremely rapidly whenever opportunity affords—easy and quick gear-changing is a material help in meeting both of these demands. To be able to use high torque the highest possible adhesion should be maintained between tyres and ground under all conditions—there is therefore a preference for large wheel movements, large tyres, independent suspension, and, where weight permits, rigid frames. As many wheels as possible must be driven, and to provide the necessary tractive effort to make use of great adhesion a much lower bottom gear should be provided. Several of these features, particularly large tyre sections, help in reducing sinkage and rolling resistance; all of them involve an overall increase of the vehicle's unladen weight. A very much larger engine than usual is therefore unavoidable, thus itself adding to the vicious circle, as not only will it weigh more, but due to its greater torque a heavier transmission will be required. As a result a three-ton lorry built to full military specification may be expected to weigh about six tons unladen and to require an engine developing about 180 b.h.p.

OTHER ASPECTS

Many other aspects of standardization are contained in the Ministry of Supply's specification for military vehicles, including the lashing points in the form of eyes arranged around the chassis frame, each of which must be capable of withstanding a strain greater than the all-up weight of the vehicle, in order to effect safe transport by sea and air.

In addition to these requirements the military vehicle must be as economical as possible in operation and at least as reliable as the civilian vehicle of equal gross weight; there is, in fact, an outstanding need for reduced maintenance and longer life between overhauls. While none of the points which the civilian operator demands can be neglected, the specialised military characteristics must be superimposed. The cost of such a vehicle must always be greater than its civilian counterpart if judged on equal load capacity, but excessive cost will mean limited output in war and must be avoided—as in all engineering problems the solution lies in compromise. The best example that can be given of the value of standardisation in vehicles concerns the number of different items which have to be held in stock as spares: for one standard range of engines it is about 300; the corresponding number during the last war, when standardisation was impossible, at a conservative estimate was 30,000.

At this early stage the problems associated with the unification of military equipment are bewildering to a degree; but perhaps the situation is somewhat eased by the fact that only the Great Powers are capable of producing in useful quantities the bulk of the highly mechanised apparatus of war and defence. No small nation, except possibly Belgium, with its relatively large industrial development, can provide any but the simpler forms of military equipment—thus the problem's solution rests with those who appreciate its greatest need.

W. H. KENNETT

CHAPTER X

THE INFLUENCE OF NEW WEAPONS UPON THE CONDUCT OF WAR

The purpose of this chapter is to deal with recent developments of weapons from the point of view of the principles of war; the writer is in no degree qualified to discuss them from the scientific angle. The scientist invents them, but it rests with the politician and the strategist to decide if, when, where, and how they are to be exploited. These decisions rest upon non-scientific factors and must be based upon the principles of war, which remain constant, though the methods of their application are liable to continual change in the light of the development of human knowledge. The word "knowledge" has been used deliberately rather than the word "progress"; it is surely not progress when the best scientific brains invent a medium of destruction of the power of the atom bomb. If the next step is the hydrogen bomb, the argument will be further reinforced. It is not by means of mass destruction that the human race can progress.

The balance between theory and practice as regards the developments of science is admirably expressed in terms suitable for the understanding of laymen by Dr. Vannevar Bush, who during the greater part of the late war was Chairman of the National Defence Research Committee of the United States, in his book *Modern Arms and Free Men*. The present writer must hereby acknowledge the inestimable value that this book has been to him in writing this chapter.

After every major war a school of thought arises which maintains that the latest weapon has rendered all its predecessors obsolete and revolutionised the conduct of war. After World War I there were people who said that man's conquest of the air had rendered navies and armies obsolete and that in any future war the airmen would reign supreme. World War II disproved this extreme view and established two outstanding facts:

(1) That the success of operations on the sea or the land was absolutely dependent on superiority in the air.

(2) That, as in the past, the final issue of any war is decided by men fighting on the ground. The completely decisive naval victory of Trafalgar did not bring peace in its train. Ten years elapsed before decisive victory on land at Waterloo ended the war. The experience of both recent world wars has repeated this lesson and also proved that the *coup de grace* cannot be delivered in the air any more than on the sea.

Probably most people have at one time or another speculated on the possibility of the development of what has been called push-button warfare. We have perhaps conceived of huge underground operation rooms where men sit gazing at television screens, which visually record the passage of wireless-controlled missiles to their target. When the target appears on the screen the appropriate button will be pushed, with devastating results. Under such conditions the men of the opposing sides would never see one another; they would all be employed either manufacturing the weapons of war or servicing the vast ground organisation required for launching them. Their sole contact with the enemy would be if one of his missiles dropped in their midst. If ever such methods of waging war became practicable, it is the writer's conviction that they would be subject to so many political, psychological, and economic limitations that they are unlikely to be exploited in the foreseeable future.

The question of mass destruction depends upon the successful solution of two problems. First of all we need the medium of destruction. This unfortunately we already have in the atom bomb, with the possibility of the hydrogen bomb to follow. There is also the possibility of biological warfare, which will be dealt with briefly later. Secondly we need devices to transport the medium of destruction to the target. For this purpose we first of all have the aeroplane, flying perhaps in the stratosphere. Secondly there is the rocket, ascending to as much as 75 miles above the surface of the earth, and falling thence at a speed of some 3,000 miles an hour. It is, however, unlikely ever to be successfully fitted with an atomic warhead. Thirdly there is the possibility of pilotless aircraft. It is scientifically possible to produce such a machine which could take off and land automatically and fly thousands of miles, adjusting itself in its passage to weather vicissitudes. It could also be made to navigate itself to the target and drop its missile at the right moment. All this constitutes one side of the question, and it is upon this side that those who aim to make our flesh creep tend to concentrate.

Turning to the other side, the instinct of self-preservation is strong in the human race and it is unwise to suppose that, faced with the prospect of destruction, men will not be diligent in their search for security against the menace. They have been, and the results of this diligence are impressive. The foundation of the defence against attacks of this nature is radar, which can give warning of the approach of the engines of destruction and can guide the counter-attack to its target. Several different forms of counter-attack are possible. There is the fighter aircraft, whose function as we knew it in the last war has been profoundly modified by the invention of the jet engine. The speed and huge turning circle of jet aircraft have probably rendered the air dogfights of the past out of date, while their immense fuel consumption greatly decreases the possibility of providing fighter escort for the fleets of bombers. This last fact, of course, greatly favours the defence. The best weapon for air combat is the rocket shell. It is not easy to aim and this is best achieved by aiming the aircraft at the target and firing straight ahead. A fighter can do this; a bomber cannot. Fighter aircraft are of course no use against rockets, but the pilotless aircraft is at their mercy.

As regards anti-aircraft artillery, the development of the proximity fuse has immensely increased its efficiency. The possibilities are summed up in the following extract from Dr. Bush's book. "Automatic guns can be made to follow the indication given by a radar set and to point precisely at all times. Electronic computers can give proper lead for the speed of the target, allow for all the vagaries of the trajectory, cancel out the effect of roll of a ship, and in general aim with a prescience that verges on the uncanny. Finally, proximity fuses can trigger off the shells at just the right moment for most lethal effect." *

While the above facts are heartening from the point of view of the defence against air bombing, they are of course only applicable to defence against comparatively low-flying aircraft. When we ascend into the stratosphere we are out of range of anti-aircraft guns. This is where the high-speed guided missile comes in. It can be fired from the ground or from an aircraft, it can go as high as the bomber and it is equipped with a proximity fuse. In this connection it seems likely that the ram jet, extremely simple and most efficient as a means of propulsion at very high speeds for a very short time, has a great future before it.

It is a serious error to leave the question of expense out of the consideration of all these developments. The economic resources of all nations are limited and success in war will largely depend on whether what is available is put to the best purpose and not squandered on unprofitable ventures. The history of the German V.1 is a good example of this. It was developed with the intention of launching 3,000 missiles per day on London and the Channel ports during a period of several weeks before the launching of the Allied invasion of Western Europe. Had it been possible to carry out this plan completely it might well have stopped the invasion altogether and thus paid a handsome dividend. But we received warning of it and our counter-measures were successful to the point of allowing it no more than a nuisance value. Being wise after the event, it is clear that it would have been more economical if the material and labour devoted to producing the V.1 had been put into jet fighter aircraft, which might well have seriously interfered with our policy of isolating the Normandy battle area by bombing the communications leading to it. With the possible exception of the ram jet, all the devices so far mentioned in this chapter are extremely expensive, and accordingly any nation desiring to exploit them must plan very carefully indeed if full value is to be obtained from all available resources.

The following conclusions seem to emerge from this brief survey.

(1) The defence against bombing raids of the type common in the last war is today probably stronger than ever before.
(2) The pilotless aircraft is unlikely to pay a dividend on the great expense involved in its production.
(3) The rocket is a formidable weapon at comparatively short ranges, but at long ranges can only be effective at a target so huge as to minimise the inaccuracies of its flight: it is also not suitable as a carrier of the atom bomb.

We have so far considered the various methods of conveying destruction to the target. Something must now be said about the atom bomb itself. First of all, by its terriffic effect it may decrease the cost of destroying large targets. Secondly, it produces a vast degree of destruction instantaneously. Thirdly, its vital materials can be stored for long periods without deteriorating.

The results produced by the bomb vary according to the element in which it is exploded. If exploded in the air—as at Hiroshima and

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* *Modern Arms and Free Men*, p. 45.

Nagasaki—it achieves the maximum blast effect over a very large area, but the subsequent danger of radio-activity is small. On the other hand, if exploded under water—as at Bikini—a wall of mist is created which spreads over the face of the earth and contaminates all with which it comes in contact to such an extent as to make decontamination very difficult if not impossible. Large areas may thus be rendered uninhabitable for very long periods.

As regards biological warfare, this has been within the bounds of possibility for some considerable time. Its potentialities are fraught with a degree of horror which perhaps accounts for the hesitation which has so far prevailed with regard to its use. The whole question is purely speculative and it is only possible to express the fervent hope that this hesitation may continue indefinitely.

What has been written so far represents, in very brief outline, the possibilities and limitations of recent developments of weapons; in other words, the factors which those who plan for war will have to consider when deciding how these weapons should be used. They will of course need to take many other factors into account, and this is an appropriate moment to draw attention to a lesson of the last war, which will probably apply with even greater force to any future conflict. Under the complex conditions of the modern world it does not suffice to have as your single war aim the unconditional surrender of the enemy. It is necessary so to plan that, when the fighting ends, you have in your hands whatever is necessary to establish the security and well-being of the post-war situation. The rulers of the U.S.S.R. appreciated this fact in the last war and conducted their campaign with a view to ensuring that, when the fighting ended, their troops were in occupation of such parts of Europe as they wished subsequently to control, that being their idea of security and well-being. The Allies, intent on unconditional surrender, thus allowed the Iron Curtain to descend much farther west than it need have, and allowed Communist regimes to be established in Yugoslavia and Albania at the point of British bayonets issued to the resistance movements solely for use against Germans. The immense power of the atom bomb will certainly force future planners to consider very carefully exactly what sort of situation they desire to be confronted with when fighting ceases.

In view of the sharp lessons that the world has had on the importance of collective security, we may take it as certain that it will be impossible to localise any future war in which the atomb bomb is used; it will inevitably spread over the whole globe. This being the case, there can be no possibility of a war in which all the atom bombs and other forms of frightfulness are on one side; both sides will almost certainly have an adequate stockpile of them. It is also clear from what has been said above that, unless some government or governments display incredible negligence, anyone who in future attempts aggression in the air will be confronted with a very formidable, hard-hitting defence organisation. Of course, however good the defence, some missiles will reach their targets. But it is unpredictable to what extent this will be the case, and any plan based on the assumption of the destruction of such and such a target in such and such a space of time will present many hostages to fortune. We know from the experience of the immediate post-war state of affairs in Germany that the victorious side in war is in an awkward situation if it finds itself in occupation of the territory of a defeated nation whose economic structure has been completely destroyed in the course of the war.

In the light of all these factors, the potential aggressor of the future will have to think very carefully and clearly before he decides to throw down the gauntlet. If he is wise he will start with a careful check of the security arrangements of his homeland and of any allies upon whose support and assistance he is relying. Is the scheme of anti-aircraft and civil defence sound? Are the industrial plants at his disposal so positioned as to gain the maximum advantage that dispersion gives against air attack and at the same time hampered as little as possible by the disadvantages which dispersion entails through complicating the transport problem and increasing the length of hauls? He will, unless he is incredibly foolish, appreciate that one of the main lessons of World War II was that human resistance to the moral effect of bombing from the air is strong, and that this is likely to apply equally to both sides in any future conflict. He will need to be quite clear in his mind as to the situation in which he wishes to find himself with regard to the territory and peoples of his opponents at the end of a war in which he has been successful. If he wishes to occupy the territory and control the people of any of his opponents, he will not wish to find himself faced with the problem of dealing with a chaotic shambles. He will therefore hesitate to go all out for the atom bombing of such areas.

On the other hand, he may decide that his interests will best be served by neutralising some of his opponents by endeavouring to minimise their active interference in the contest. He will unhesitatingly use the full force of his stock-pile of atomic bombs against such an opponent, feeling that if the country concerned is reduced to complete chaos, he can leave it to stew in its own juice with impunity. This line of reasoning may lead him to the conclusion that the atom bomb is best employed as a counter-offensive weapon to seal off the decisive theatre of operations and prevent its reinforcement from outside by destroying the communications leading into it. This idea will bring his thoughts back full circle to their starting-point. To what extent is he secure against the atom bombs of his opponents? For clearly the best counter to an act of aggression is to render its advance impossible. It would be awkward for him if his adversaries succeeded in bringing his offensive to a complete standstill by the destruction of the communications upon which it depended, and then let him stew in his own juice. He will reflect that the increased effect of atom bombs exploded under water renders ports where the sea is deep close inshore particularly vulnerable to atomic attack. If the radio-active mist produced by a submarine atomic explosion passes over such a port it will be rendered useless for an indefinite period. He will look around the coasts of the main theatre of war and consider whether he can turn this fact to his advantage or whether it can be exploited against him. Railways which follow a coast-line would seem also to be suitable targets for this type of attack.

Having dealt with the train of thought likely to pass through the brain of a hypothetical aggressor, it will be well to conclude this chapter by a brief consideration of how modern developments affect the defence of the United Kingdom. First of all, there is the truism that, both in peace and war, the life of the people of this island depends on supplies from overseas.

In two successive wars our superiority at sea has been hard put to it to ensure the regular arrival of supplies in sufficient volume in face of the menace of the submarine. In any future war we shall certainly have to contend against attack by submarines far superior to their predecessors of the two last wars. Craft with a submerged speed of 20 knots, capable, thanks to the schnorkel device, of remaining submerged for very long periods. But methods of anti-submarine defence have also advanced. There are the sonobuoy and magnetic airborne detection to assist in locating a submerged attacker. But the speed of convoy escort craft will of course need to match the increased speed of the submarine.

Secondly, this island is a very vulnerable target to atomic attack. It is highly industrialised, thickly populated, and its comparatively small size allows of little scope for dispersion. On the other hand, as we have seen, the means of defence against air attack have also made great strides and we know from experience that our spirit does not readily break under the strain of severe bombing from the air. As a nation we possess one priceless moral asset in war. Our immunity from overseas invasion since 1066 has endowed us with an inability to appreciate the possibilities and consequences of total defeat. We have suffered defeats in the past, but always on foreign soil, and they have not brought in their train the horrors of hostile occupation or humiliating peace terms. It is earnestly to be hoped that the threat presented by the new engines of destruction which now bedevil world affairs will not weaken this instinct in our race. For, in spite of all that science has produced to increase the horrors of war, one prophesy can safely be made. The next war, in common with all past wars, will be won by the people who best maintain that vital spirit that is best exemplified in the famous exchange of remarks which took place on the morning of February 14, 1797, between Sir John Jervis and his Flag-Captain as the ships of the combined French and Spanish fleets appeared successively over the horizon. "Twenty sail of the line, Sir John." "Very well, sir." "Twenty-five sail of the line, Sir John." "Very well, sir." "Twenty-seven sail of the line, Sir John; near double our number." "Enough, sir, enough, the die is cast, and if there be fifty sail I will go through them."

E. H. WYNDHAM

CHAPTER XI

FOREIGN NAVIES

THE YEAR 1949 has seen, in the main, a continuation of those policies which have governed, with one notable exception, the development of all major navies since the end of the war. It is chiefly a policy of retrenchment, of a continually contracting economy of force, until research and development have produced a satisfactory answer to the atomic bomb, the guided missile, and the fast submarine. Almost all new construction has been slowed down to a state of virtually suspended animation, even the United States drawing in her horns sharply in new naval building.

The single exception is Russia, where, if Swedish reports are to be relied upon, the Baltic shipyards are working overtime on ships of all classes. The year, it is reported, has seen two new battleships completed and, apparently, commissioned, together with one, and possibly two, carriers. Further new battleships are under construction. There is an impression of unreality about this Russian naval expansion, if only because it seems to be based on a faulty strategic conception of modern naval requirements. Yet the reports from Sweden that a Russian battle-fleet on the old model is in the process of being built up cannot be entirely dismissed.

The smaller navies of the world have continued to re-equip themselves with the surplus vessels of the major powers, but at a greatly reduced rate compared with 1947 and 1948. This is due mainly to the exhaustion of available vessels from the United States and Great Britain, both of which have now re-established their navies on a reasonably steady peace-time basis and no longer have an excess of warships for disposal. A modest amount of new construction is being carried out in various countries, but there appears little urgency to complete ships already on the stocks until the general pattern of future naval warfare becomes less obscure.

The belief is becoming more and more apparent that the dominant naval weapon of the future, even more than the controlled missile and the atomic bomb, is likely to be the "true submersible" with an underwater speed of over 20 knots. Research in countries with the larger and more important navies is being directed to both sides of this question—development and antidote. The First Lord of the Admiralty has stated in the House of Lords that he knew of no nation which was yet within measurable distance of producing a submarine capable of submerged speeds of 20 knots or more. It follows that as yet a high underwater speed—except for short bursts of a few minutes—is still a development of the future, and current reports from the United States on the speeds of the new "Guppy" (Greater Underwater Propulsive Power) design must be treated with reserve.

UNITED STATES

The original sum voted for the United States Navy for the fiscal year 1950 (1 July–30 June), amounting to $5,111,600,000 (£1,277,900,000 before devaluation), was reduced by a substantial budget cut during the year which envisaged the laying-up of 72 vessels, including three fleet and nine light fleet carriers. On October 30, 1949, the Navy Department announced that 77 ships, including five aircraft carriers, were being withdrawn from sea-going service as an economy measure. The details released so far are not sufficient to indicate whether this cut in strength is in addition to the one announced previously, though it appears unlikely that, in the present state of world tension, the United States would countenance so large a reduction as 149 vessels of their 1948 strength—approximately one-fifth. It is more likely to be the result of the budget cut in February 1949. The majority of the ships to be laid up are from the Atlantic Fleet.

The appropriation for the fiscal year 1951 is $4,448,181,000 (£1,112,065,000 before devaluation), a figure some $80,000,000 below the sum asked for in the President's budget. The House of Representatives Appropriations Committee reported that a substantial reduction of funds for the Services would cripple the national defence effort of the United States and that, in fact, it was even felt that there was ample warrant for a number of increases. "Undoubtedly," commented the Committee, "we are taking certain very grave risks in not being better prepared."

The Navy and Marine Corps are to be reduced in strength by 54,891 men by July 1, 1950, in consequence of the reduction in the number of ships in commission. The 1949 totals were 45,534 officers and 378,944 enlisted men in the Navy and 7,001 officers and 78,530 enlisted men in the Marine Corps.

Mr. James Forrestal, who was Secretary of the Navy from May 1944 to December 1947, and then the first Secretary of Defence until March 1949, died on May 22, 1949. He had been succeeded at the Navy Department by Mr. John L. Sullivan and at the Defence Department by Mr. Louis Johnson. Mr. Sullivan was succeeded in April 1949 by Mr. Francis Matthews. Admiral Louis Denfeld was removed from the post of Chief of Naval Operations because of his evidence before the House of Representatives Armed Services Committee, and has been succeeded by Vice-Admiral Forrest Sherman, who had been in command of the United States Sixth Task Fleet in the Mediterranean. Admiral William Blandy, Commander-in-Chief of the Atlantic Fleet since February 1947, retired on February 1, 1950, and was succeeded by Admiral William Fechteler, Chief of Naval Personnel and a former Commander of the Atlantic Fleet.

Work has continued during the year on the permanent fleet base being constructed in the Aleutian Islands. U.S. Navy officials reported during July 1949 that natural gas had been found six miles south of Point Barrow, in the Alaskan Arctic. This is the first discovery of fuel in the Arctic region and may prove to be a factor of extreme strategic importance in the Pacific theatre.

As in the previous post-war years, the main body of naval research has been directed into the development of guided missiles and anti-submarine warfare. The Navy Department acquired in 1948 Point Mugu, California, as a guided missile testing centre. The total estimated cost of equipping the site is stated to be $30,000,000, of which $14,000,000 was to be spent in 1949 and 1950.

A two-stage rocket reached a height of 250 miles on February 5, 1949, at the White Sands Proving Ground, New Mexico. It was made up of a

German V.2 rocket with a smaller W.A.C. "Corporal" in the nose. The smaller projectile was fired by remote control at a height of approximately 120 miles, and the maximum speed reached during the ascent was stated to be in the region of 5,000 m.p.h. The seaplane tender Norton Sound, which has been converted to an experimental rocket-firing ship, is designed to enable 14-ton rockets to be fired at sea. Trials to be carried out will include the firing of German V.2 type and the U.S. Navy's "Aerobee." The seaplane deck has been sheathed with metal to withstand the heat generated in launching rockets from a vertical cradle.

Research into anti-submarine warfare has proceeded unabated alongside that of further developments in underwater speeds. The Russian bogey has been raised on various occasions and the large number of German-type submarines believed to be operated by that country has frequently given cause to the Navy Department to stress that the development of new techniques of attack is a "No. 1 priority with the Navy." Vice-Admiral J. D. Price, Deputy Chief of Naval Operations, told a Senate Appropriations sub-committee that 25 per cent. of land-based naval planes and 10 per cent. of carrier-borne planes were being fitted with a new "secret device" to detect U-boats fitted with schnorkels. This could only be a more sensitive radar installation, and on February 25, 1950, a Navy Department spokesman announced that the Navy had accepted delivery of a new model of the long-range 'Neptune' aircraft, built by the Lockheed Aircraft Corporation, fitted with a sensitive search radar which permitted the detection of smaller targets over a much greater range than had been achieved before.

This statement was followed by a more surprising one that submerged detection was being investigated by the use of sonobuoys, which automatically transmit to patrolling aircraft the propeller noises picked up by a hydrophone attached to the buoy. Sonobuoys were used extensively during the last war against German U-boats and it would be indeed surprising if anti-submarine research had not progressed beyond that rather doubtful aid to detection. Other trials being carried out in this direction were indicated in a statement made by Mr. Daniel Kimball, Under-Secretary of the Navy, in which he touched on the development of a new type of submarine designed to locate and destroy other submerged submarines.

That the programme of underwater detection research is to be pushed to still greater lengths was stated by Vice-Admiral Cassady, Deputy Chief of Naval Operations for Air, who informed the House of Representatives Appropriations Committee that the Navy was making sharp reductions in its air strength in order to concentrate on counter-measures against submarines. The reductions, he stated, would entail a considerable deficiency in the Navy's air operating needs, but were accepted in view of the greater urgency of the U-boat problem.

United States research and development along the lines of high underwater speed have progressed in two directions, the "Guppy" and the hydrogen-peroxide engine. The "Guppy" programme is stated to be "the first of a series of long-term plans for the production of the true submersible." The system is roughly a development of the German Type XXI U-boat, of which some at least had a speed of 17 knots for half an hour to an hour, and of 12 knots for three to four hours, achieved by the use of more powerful batteries and motors and an extensive streamlining of the hull. The Walther-cycle hydrogen-peroxide engine is still under development in the Annapolis experimental laboratories and is not likely to be put into a submarine for some time. This line of research is a development of the German Type XXVI, of which one U-boat was stated to be "almost ready at the end of the war" with a speed of 26 knots.

Such atomic experiments as have been carried out during the past year have, as usual, been shrouded in secrecy. Since the two explosions at Bikini in 1947, no foreign or press observers have been present. The tests have been carried out at Eniwetok Atoll, in the Marshall Islands. It is reported that the test explosion which was to have been carried out at Eniwetok in the spring of 1950 has been postponed for a year, and it is thought possible that the 1951 explosion will be of a hydrogen bomb.

It was announced during the year by the Chicago Operations Office of the U.S. Atomic Energy Commission that a contract had been placed with the Westinghouse Electric Corporation of Pittsburgh for the construction of an experimental nuclear reactor to meet specifications for eventual use for ship propulsion. An atomic power plant might save weight in boilers, engines, fuel oil, etc., of a large ship, and would probably allow of the elimination of funnels. No time clause has been included in the contract for the completion of the experimental reactor.

The United States are putting into mass production an improved Geiger counter to detect the extent of radioactive penetration after an atomic explosion. It is expected to keep the weight of the instrument below 10 lb.

It was officially announced during 1949 that the strengths of the two main fleets were as follows:

ATLANTIC

(INCLUDING NAVAL FORCES IN EUROPE AND THE MEDITERRANEAN)

Ships manned 65 to 76 per cent. of wartime complement: 6 fleet carriers, 4 escort carriers, 12 cruisers, 53 destroyers, 41 submarines, 3 destroyer escorts, amphibious "lift" for two regimental combat teams.

Ships manned with reduced complements for training of reserves, etc.: 2 light fleet carriers, 1 battleship, 4 cruisers, 18 destroyers, 5 destroyer escorts.

PACIFIC

(INCLUDING NAVAL FORCES IN FAR EAST AND WESTERN PACIFIC)

Ships manned 65 to 76 per cent. of wartime complement: 6 fleet carriers, 3 escort carriers, 15 cruisers, 48 destroyers, 35 submarines, 5 destroyer escorts, amphibious "lift" for two regimental combat teams.

Ships manned with reduced complements for training of reserves, etc.: 16 destroyers.

In addition to the above the U.S. Navy maintains a "mothball" fleet of 1,970 vessels, a figure which includes 664 major types of warship. The battleship Missouri, the last to be kept in full commission in any American fleet, was reduced to training status early in 1950.

The above figures indicate a slight increase in the strength of the Pacific Fleet and a slight reduction in the Atlantic as compared with a year ago.

It has been stated that the Navy Board's policy in regard to new construction is to place as many orders as possible in private yards. This has been decided because "since the war there has not been a sufficient backlog of work in these yards to occupy their personnel and maintain their vital ship-building skill," whereas the Navy yards have been kept busy with ship repairs and overhauls.

A large-scale combined exercise, known as Operation Portrex, was carried out in Caribbean waters during the early part of 1950. Admiral Fechteler was in overall command, with Vice-Admiral D. B. Duncan in command of the naval force, which included the four carriers Franklin D. Roosevelt, Leyte, Phillipine Sea, and Wright, and a number of cruisers, destroyers, and submarines. Vice-Admiral Symonds-Tayler, the British C.-in-C. of the America and West Indies station, took part in the exercise with H.M. ships Glasgow, Snipe, and Sparrow, and the Canadian carrier Magnificent and destroyer Micmac. The object of the exercise was to recapture an island off the coast of Puerto Rico strongly held by an "enemy aggressor" who had submarines and aircraft available to repel the invasion attempt. A combined force of 80,000 men was engaged in the exercise. The island was duly recaptured, but the enemy submarines, at a cost of three of their number, were judged to have sunk the carrier Wright twice, three destroyers, two destroyer escorts, one patrol craft, one repair ship, two L.S.Ms. and five L.S.Ts.

In addition to the above, a programme of cold-weather exercises, largely anti-submarine in nature, have been carried out in Arctic and Alaskan waters. A large-scale amphibious exercise was also carried out in the Pacific in which a naval task force of nearly 100 vessels under the command of Rear-Admiral C. H. McMorris was employed to protect a strong military force on Oahu, in the Hawaii Group.

Experiments have been carried out during the year with an electrolytic process designed to give a protective magnesium coating to ships' bottoms to reduce the necessity for periodical dry-docking. A device has also been produced to reduce the rolling of a ship at sea by as much as 80 per cent.

The U.S. Maritime Commission is developing a prototype hull from which cargo, tank, and troop-carrying ships can be built at a rapid rate in an emergency. The vessel is said to be of 10,500 tons displacement, 477 feet overall, and engined with geared steam turbines to give a maximum speed of 18½ knots, much above that of the Liberty ships mass-produced during the war.

It is reported that a new assault boat, constructed of spun fibreglass woven into cloth and impregnated with plastic, has been produced for service in the fleet. The boat weighs 300 lb. and is powered with a 33 h.p. engine. It carries 15 men and is claimed to be warp-proof, fungus-proof, and temperature resistant. It compares with the previous M2, which weighed 410 lb., with a 22 h.p. engine and accommodation for 12 men.

A new air speed of Mach No. 5·18 was achieved in the supersonic wind tunnel at the Naval Ordnance Laboratory, White Oak, Maryland. It was set up at a temperature of —377° F. The speed obtained is equivalent to 3,960 m.p.h. under conditions of normal temperature at sea level. The previous best speed achieved was Mach No. 4·38. The equipment, originally in the German research station at Peenemunde, was captured at

Kochel, Bavaria, during the advance into Germany and shipped to the United States, where it was modernised to a design worked out by the research department of the Naval Ordnance Laboratory.

BATTLESHIPS

The United States Navy, like the British, now has no battleship in full operational commission, the Missouri having been reduced to a training status. At the time the decision was taken it was emphasized that 14 other battleships, now in reserve, are being kept "ready for reactivation on short notice."

The 45,000-ton Kentucky, the fifth ship of the 'Iowa' class, and the 27,500-ton battle cruiser Hawaii, on which work was suspended pending a decision to fit rocket projectors instead of guns as main armament, are still uncompleted and may now never be completed.

AIRCRAFT CARRIERS

The decision to halt the construction of the new 65,000-ton carrier United States, made during April 1949, still stands and no further work has been carried out on her.

The Boxer, an 'Essex' class fleet carrier of 27,100 tons, has been added to the Pacific Fleet, reinforcing the Seventh Task Fleet in the Western Pacific. The Oriskany, also of the 'Essex' class, has been completed to an altered design which incorporates larger lifts, more powerful catapults, a stronger flight deck to enable her to operate larger aircraft, probably of a jet-propelled type, and increased stowage for aircraft. It is reported that the Essex and Wasp are to undergo similar modification and that eventually the whole class will be altered to the new design. The Franklin is now laid up at the Naval Shipyard Annex, Bayonne, as part of the "inactivated" Atlantic Fleet Reserve, and the Princeton, Tarawa, and Antietam have been added to the "mothball" fleet.

The Bataan and Cabot, of the 11,000-ton 'Independence' class, are being converted to specialise in anti-submarine warfare. They carry 45 aircraft. The Bataan is already in commission. It is expected that the 'Bogue' class of carrier, which were converted from merchant ship hulls in 1942, will shortly be put on the list for disposal. The class now comprises ten ships.

On March 7, 1949, a 'Neptune' bomber, weighing 37 tons, was successfully flown off from the flight deck of the Coral Sea with rocket-assisted take-off. She carried a bomb load of 5 tons for a distance of 2,000 miles before returning to base. It was stated that this type of bomber can handle atomic bombs.

CRUISERS

The Newport News and Salem, the remaining two ships of the 17,000-ton 'Des Moines' class of heavy cruiser, were completed during 1949. Like the Des Moines, their main armament of nine 8-in. guns, mounted in triple turrets, are fully automatic with a rate of fire four times that of any other guns of the same or greater calibre. Cartridge cases have replaced wrapped charges and shells have automatic fuse setting. The secondary armament consists of twelve 5-in. dual-purpose guns in twin mountings, and they carry in addition twenty 3-in. A.A. and twelve 20-mm. A.A. guns. The Newport News is completely air conditioned, and similar equipment is being installed in the Salem. The Des Moines has not as yet air conditioning.

The Roanoke, a sister ship of the 14,700-ton light cruiser Worcester, was commissioned at Philadelphia Navy Yard in April 1949. The Huntington, of the 10,000-ton 'Fargo' class of light cruiser, has been laid up in the "mothball" fleet, and the hull of the Newark, also of the 'Fargo' class, on which last year it was reported that work had been resumed, was sold for scrap in 1949.

The two anti-submarine "hunter-killer" ships, mentioned last year in "Brassey's Naval Annual" under the section devoted to destroyers and submarines, should more properly have been included under the heading of cruisers. The first of these, the Norfolk, is being built by the New York S.B. Corporation, and her sister ship, still unnamed, by the Philadelphia Naval Shipyard. No details have been released, but they are believed to be of between 5,500 and 7,000 tons and resembling the 'San Diego' class of cruiser. Their cost is reported to be in the neighbourhood of $40,000,000 per ship.

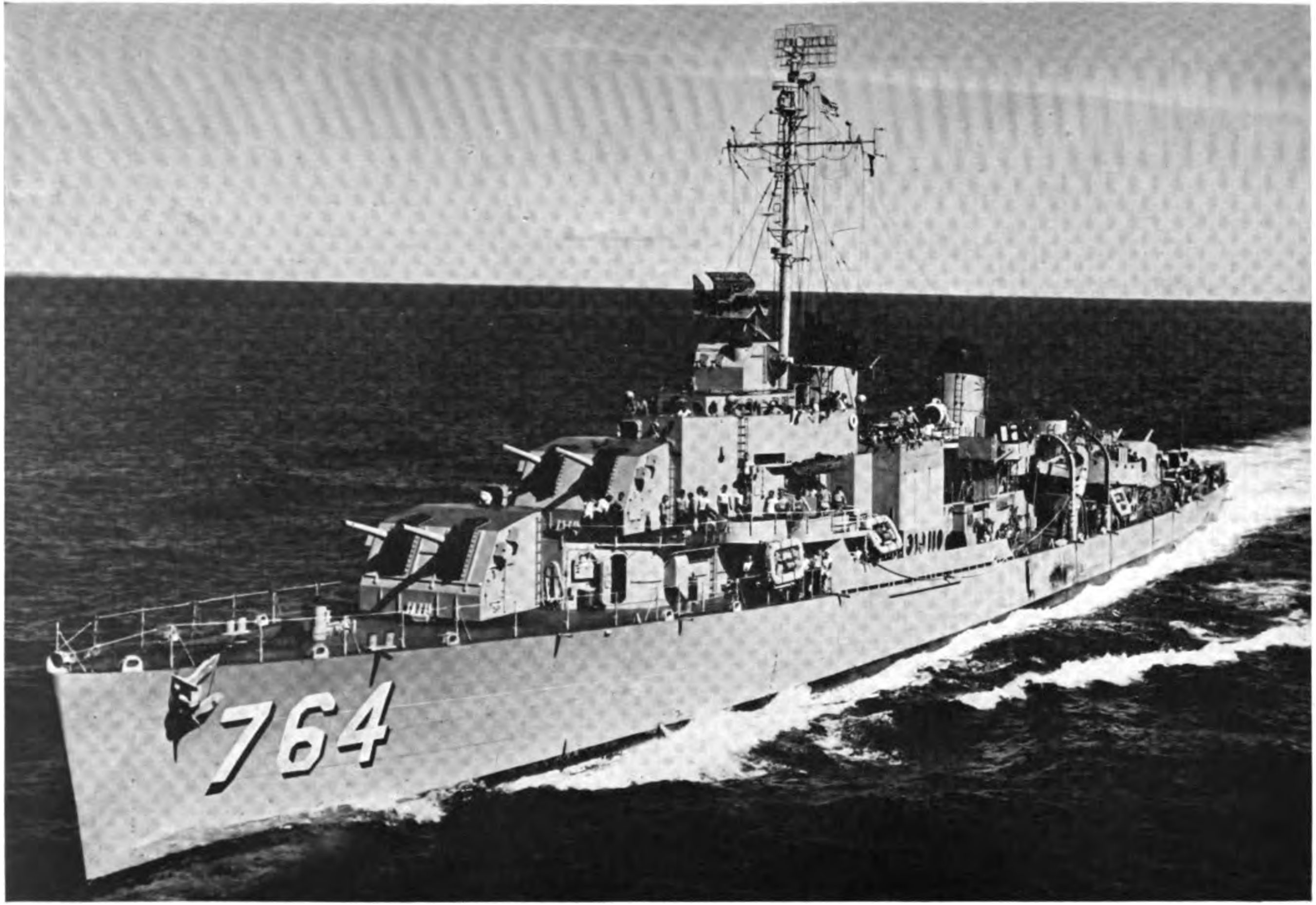
Among the cruisers reported laid up in reserve during the past year are the Astoria, Atalanta, Dayton, Duluth, Little Rock, Portsmouth, Providence, Topeka, Fresno, Oakland, and Tusson.

DESTROYERS, SUBMARINES, ETC.

Work on the four new destroyers, John S. McCain, Mitscher, Wilkinson, and Willis A. Lee, has proceeded during the year and they should be completed fairly soon. They will be larger than the 'Gearing' class (2,400 tons), having a reported tonnage of 3,650, and are designed for anti-submarine duties. There are no reports of a resumption of work on the Castle, Seaman, Lansdale, S. D. Owens, or Woodrow Thompson, all of the 'Gearing' class, which was halted last year. The Timmerman, also of this class, which was being completed to a new design incorporating "more powerful machinery of light weight," is still, so far as is known, not yet in commission. Nor has any indication yet been given of the nature of her new power plant, though presumably it is of a gas-turbine type. It is possible that the destroyer escorts Vandivier and Wagner, on which work was suspended last year, will now be cancelled.

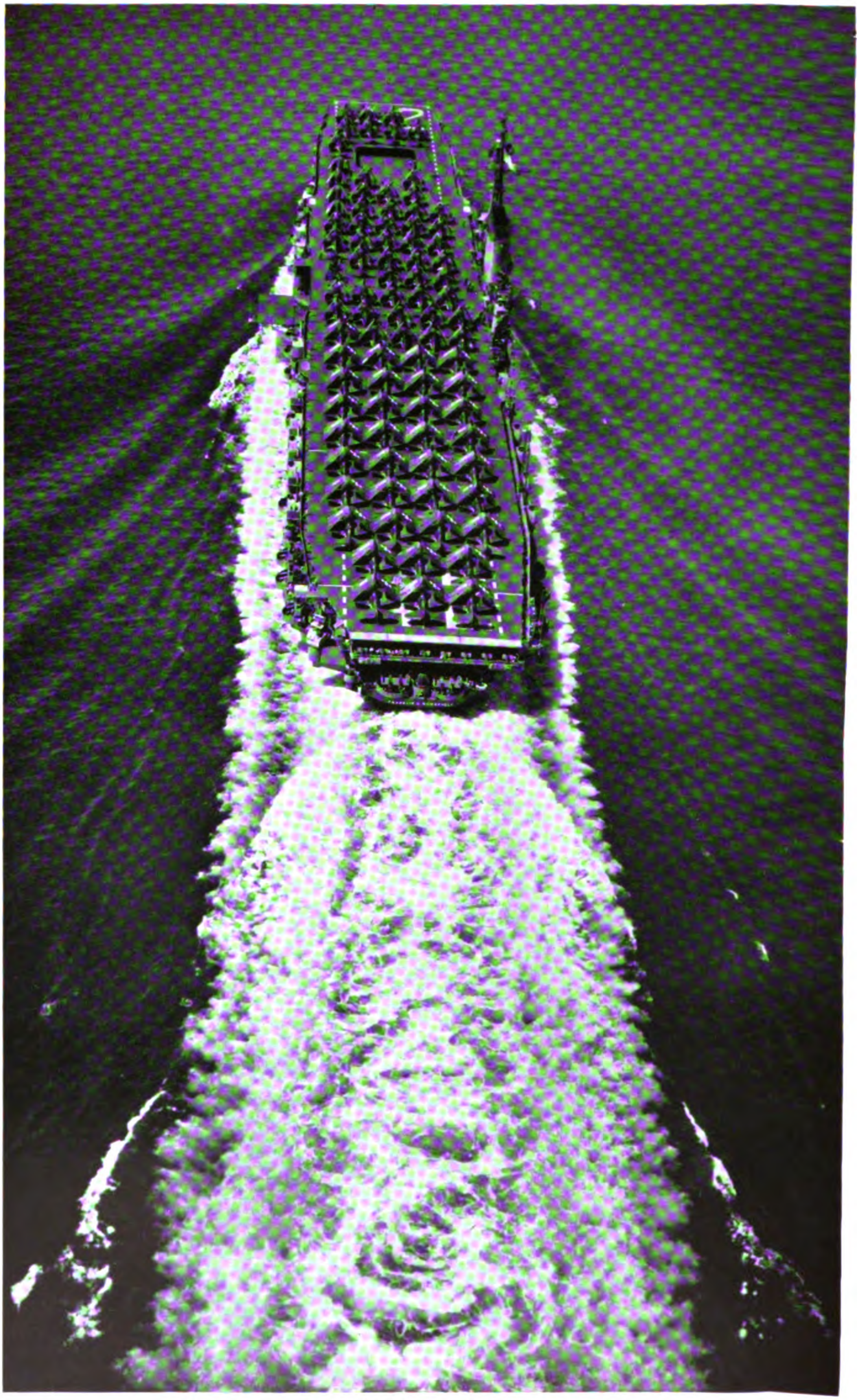
The conversion work on older submarines to the new "Guppy" design has been continued throughout the year. While the "Guppy" is admittedly not in itself a solution of the high-submerged-speed aspect of new submarine design, it does give a greater speed (from 18 to 21 knots has been mentioned) for a period sufficiently long to deliver a high-speed attack. A number of boats of the 'Corsair' and 'Balao' classes are being taken in hand for this conversion and for the fitting of schnorkel tubes.

No further details have been released about the new "High-speed Attack Type" boats of which four were authorised under the 1948 programme. The keel of the first of them, the Trigger, was laid on February 24, 1949, and the other three are all believed to be in various stages of construction. They are to be fitted with hydrogen-peroxide engines and schnorkel tubes, the former of which may mean some serious delay in



American Destroyer. U.S.S. Lloyd Thomas

U.S. Navy Official photograph



Aircraft ranged on flight deck. U.S.S. Franklin D. Roosevelt

U.S. Navy Official photograph

completion. The nine boats of the 1949 programme include two of an experimental 2,000-ton type which are expected to cost $12,000,000 each, an indication that they are likely to be of an entirely novel design.

On August 26, 1949, the Cochino, of the 1,526-ton 'Balao' class, caught fire and sank after two battery explosions while exercising off the northern coast of Norway in an Arctic training cruise. The Guavina, also of this class, is being converted into an oiler.

NAVAL AVIATION

The United States Navy announced recently a sharp reduction in air strength. Three carriers are being laid up and 27 combat units eliminated. Carrier air groups will be reduced by 5, marine squadrons by 11, patrol squadrons by 10, and anti-submarine squadrons by 1. This is a reduction of 1,560 aircraft and the Navy is taking 1,273 pilots off flying duties, closing five air stations, reducing five others, closing four major overhaul stations, cutting flight training by 600 students a year, and eliminating billets for 6,000 enlisted personnel. The reason for this drastic reduction is in order to release additional funds from the Navy Vote for anti-submarine training and research. The Navy will be buying only 817 new aircraft in 1950–51, leaving a deficiency of 530 in operational requirements.

The most important trials during the year have been conducted mainly with heavy bombers and special aircraft designed for submarine hunting. The 'Neptune,' with a flying weight of 37 tons, has been successfully handled on board a large fleet carrier, thus proving that a heavy bomber capable of carrying an atomic bomb can be launched at sea from an existing carrier. It was one of the arguments in favour of the building of the cancelled 65,000-ton carrier that she would be able to operate bombers large enough to take the bomb. In the field of anti-submarine warfare the greatest volume of research has been devoted to the development of electronics, and it has been reported that an extremely sensitive search radar has been produced capable of differentiating between the head of a schnorkel tube and surrounding waves.

The production version of the Chance-Vought XF6U–1 ('Pirate') has an after-burning device in the tail to give the fighter extra speed. It is an auxiliary jet unit and steps up the power of the turbo-jet engine for short periods. An 8-ft. cylindrical device, which works on the principle of a ram-jet engine, is installed over the exhaust nozzle of the turbo-jet. Fuel is injected into the gas flow of the jet engine's tail pipe and burned in the excess oxygen at extremely high temperatures. As the device has no moving parts, higher temperatures can be accepted than in the turbine proper. This process gives substantially greater thrust, but is, of course, limited by the ability of materials to withstand heat.

A contract has been signed with the Ryan Aeronautical Company for the development and manufacture of a service test quantity of a high-speed, jet-powered pilotless aircraft to be used as a target plane. Known as XQ–2, it is less than half the size of a standard fighter and will be used for A.A. gunnery, combat plane gunnery, and interception problems. No technical details have yet been announced.

A new primary trainer, the 'Fairchild,' has been accepted by the Navy. It has a top speed of 174 m.p.h., a ceiling of 15,750 ft., and a range of 955 miles.

The Navy is still strong in its belief in the value of the airship for anti-submarine patrol work. During the past year an order was placed with the Goodyear Aircraft Corporation of Akron for the construction of a new non-rigid airship, claimed to be the largest in the world. Known as N.1, the new airship has a gas envelope 324 ft. long and 71 ft. wide, with a helium capacity of 825,000 cu. ft. It will carry a double-deck crew car 87 ft. long below the gas bag. It is to be powered with two 800 h.p. Wright Cyclone air-cooled engines which are expected to give it a speed of over 50 knots. A predecessor, M.1, which had a helium capacity of 100,000 cu. ft. less than the new craft, held the world's record for continuous flight without refuelling, remaining in the air for more than a week.

FRANCE

No funds were voted in 1949 to complete the Jean Bart, which still needs her anti-aircraft guns and radar installation before she can be commissioned. She has carried out her gunnery, speed, and fuel trials. Developing 175,000 s.h.p., 25,000 in excess of her nominal figure, she reached 32·4 knots in a fresh wind and heavy sea. The old battleship Lorraine, though she still retains her engines, is considered to be of no more value and is not in commission.

It has finally been decided not to build the new carrier Clemenceau, although 300 million francs had been spent on laying her keel. It is hoped instead to get the loan of a second British or American carrier to join the Arromanches (ex-H.M.S. Colossus). The Béarn, now little more than a hulk, is no longer operational.

The new 8,000-ton cruiser De Grasse is due for completion in 1951 as an anti-aircraft cruiser. Her building has been held up for technical and financial reasons. The chief of the technical ones was the design and development of her new 6-in. guns, but it seems as if this has now been satisfactorily completed. The Duquesne and Tourville, both completed in 1928, are considered to be of no further value and will probably be broken up.

Under the defence budget for 1950, the naval building programme totals 10,500 tons and includes three escort vessels, two submarines, and 3,000 tons of amphibious craft.

Among the smaller craft there has been a general weeding out of the older ships. The Ouragan, Simoun, Trombe, Mistral, Tempête, and Le Fortune, all 1,500-ton destroyers built in 1926 to 1928, have been deleted from the list, leaving only the Alcyon, Basque, and Forbin of that series; so have the 600-ton torpedo boats Melpomène, Flore, Cordelière, Incromprise, and Bouclier. In addition, two of the ex-German torpedo boats of 600 tons taken over after the end of the war are to be scrapped. They are the Bir Hakeim (ex-T.11) and Baccarat (ex-T.20). This leaves only the Dompaire (ex-T.14), which was allocated to France by the United States and transferred in 1948.

The submarines Centaure and Casabianca, of the 1,500-ton ocean-going type, are being discarded, leaving only the Glorieux and Archimède, which date from 1932–33, of the original thirty boats of this class. The Iris, of the 600-ton coastal type, has been deleted, leaving only the Junon of this class in commission. She is serving at Toulon as an asdic training submarine. The only Italian submarine taken into service after the war, the Narval (ex-Bronzo), has proved unsatisfactory and has been broken up.

The former U.2518, fitted with a schnorkel, recently made a passage from Lorient to Toulon remaining submerged the whole time. The voyage took 17 days and was made at an average speed of between 5 and 6 knots. During the trip the submarine made a deep dive off the Balearic Islands, remaining near the bottom for 91 hours.

RUSSIA

The Soviet Government has created a Navy Ministry separate from the Defence Ministry, which has now been renamed the War Ministry. Admiral I. S. Yumashev, the present naval Commander-in-Chief, has been appointed the first Minister of the Navy.

The difficulty of obtaining reliable information from countries behind the iron curtain still exists, and it is only at second hand that most of it reaches this country. Thus we have Swedish reports that two of the new 35,000-ton battleships, Sovietskaia Belorussia, and Strana Sovietov, have been completed and are now in commission. Both were laid down at Archangel in 1942. The Sovietski Soyuz (ex-Tretii Internatsional) of the same class is reported to be nearing completion in Leningrad. A fourth ship of the class, laid down in Nikolaiev and named Stalinskaya Konstitutzia, was destroyed on the stocks. It is reported that two further ships of this 35,000-ton class are under construction.

The main armament of these new battleships is believed to be nine 16-inch guns in three triple turrets, two forward and one aft, though guns of 17·7-in. have been mentioned. A reported speed is 29 knots. Russia still clings to her old crocks the Oktyabrskaya Revolutsia and Sevastopol, both completed in 1911 and both still in commission. Neither can be of any value in modern naval war.

The Graf Zeppelin, due for destruction under the terms of the Tripartite Naval Agreement, is reported in commission and is expected to go to the Far East. A second carrier, reported to be of 23,000 tons, has been built at Leningrad and should by now be in commission.

It has been stated that six more cruisers of the 'Kirov' class (8,800 tons displacement) are under construction. Names are said to be Chapev, Ch~~e~~kalov, Sazarev, Nakhimov, Kornilov, and Ushakov. Six new destroyers of over 2,000 tons are under construction, to be named Obraztsovi, Otlichni, Otvashni, Ognevoi, Opasni, and Ozarnoi. If their names give any indication they are destined for service in the White Sea. The twenty-seven frigates on loan to Russia from the United States under the Lend-Lease programme have now all been returned.

The construction of submarines is given special priority in the Soviet shipyards and the current naval programme, which is part of the present five-year plan, is designed to have 1,000 submarines completed and ready for service by 1950–51. Latest reports give the Soviet submarine strength as 360, with another hundred under construction. The majority are said to be of ex-German design of the 517-ton, 740-ton, and 1,600-ton conventional U-boat types. The stated programme of new construction sounds remarkably optimistic and, even if the German prefabrication technique is employed, seems beyond Russia's present shipbuilding capacity. A report that the hydrogen peroxide engine has been successfully developed should be treated with reserve, though it was announced last year that the engine had been fitted to the latest Russian submarines.

The present distribution of submarines is believed to be 132 in the Baltic, about 60 in the White Sea, 70 in the Far East, and the remainder in the Black Sea. The majority of the present new construction is to go to the Far East according to Russian propaganda reports.

The island of Ruegen, in the Western Baltic, is being developed as a major fleet base. The harbour of Sassnitz is being enlarged and fortified to accommodate the largest warships and a submarine and aircraft base is being constructed in Jasmunder Bodden, which is being connected with the Baltic proper by a canal cut through the isthmus to Tromper Wieck. Concrete submarine shelters are being built at three points opposite to the entry to this canal. The civilian population have been evacuated from the north coast of Ruegen from Arcona lighthouse to the village of Dranske, on Wiecker Bodden, where an extensive A.A. and radar system is being installed. In the forest of North Nonnewitz large concrete fortifications have been built, including, it is said, firing ramps for rockets and guided missiles.

ITALY

A naval building programme estimated to cost 50 milliard lire (about £20,000,000) is to be carried out between 1950 and 1955, according to Signor Pacciardi, the Minister of Defence. The programme includes the reconstruction of the two cruisers Luigi di Savoia Duca degli Abruzzi and Guiseppe Garibaldi, and the building of six destroyers, two light A.A. ships, and other smaller vessels. Of these, two destroyers and two torpedo boats, one of the latter to be powered with a gas turbine, are due to be laid down in 1950. No details have yet been announced, except that the torpedo boats are to be of 800 tons.

MMS 34 and 35, which have been on loan from Great Britain, were returned during the late summer of 1949.

OTHER EUROPEAN COUNTRIES

BELGIUM

Two minesweepers have been transferred from the Royal Navy. The Cadmus has been renamed Georges Lecointe and the Liberty is now the Adrien de Gerlache. The remaining four to be transferred are the Mutine, Circe, Brave, and Ready.

DENMARK

Two frigates purchased from Great Britain, the Holger Danske (ex-H.M.S. Monnow) and Niels Ebbesen (ex-H.M.S. Annan), are now employed as sea-going training ships for midshipmen and boys.

GREECE

As a result of post-war loans from Great Britain the Greek Navy is in better shape than for many years. The old cruiser Averoff still heads the official list of the Royal Hellenic Navy in spite of the acquisition of the ex-Italian cruiser Eugenio di Savoia. Eight destroyers of the modified 'Hunt' class are on loan, in addition to two others, ex-H.M.S. Echo and ex-H.M.S. Boreas, which are used for training duties. Six submarines and eight corvettes have also been lent to Greece, together with twelve landing craft, all L.C.Ts. of from 320 to 400 tons.

NETHERLANDS

Two new cruisers for anti-aircraft duties, De Zeven Provincien and De Ruyter, are expected to be completed this year. They are designed to be of 8,350 tons, but may be more on completion. Their armament is eight 6-in. guns in twin turrets with an elevation of 60°. The six anti-submarine destroyers of 2,100 tons, ordered in 1948 and due for completion in 1952, will be reinforced by a further six similar vessels, to be ready in 1955. The Vulkaan (ex-H.M.S. Beachy Head), which has been on loan from Great Britain as a depot ship since 1947, has been returned.

It has been decided to extend Den Helder as a naval base, and the harbour is being replanned to accommodate much larger ships. The work is expected to take eight years to complete.

NORWAY

Talks have been held in Norway on the subject of American naval aid under the Atlantic Pact. The main difficulty facing the Norwegian Navy is that it is almost completely British trained and equipped and that the acceptance of American destroyers, as proposed under the Military Aid Programme, would lead to great difficulties in replacements, repairs, and new training techniques. No final decision on this problem has yet been announced and in the meantime the Norwegian Navy remains almost entirely composed of ex-British vessels.

PORTUGAL

The five 'Vouga' class destroyers of 1,240 tons have been largely reconstructed and modernized in this country and returned to Portugal. They now have a tripod foremast and the after funnel has been lowered. Asdic and radar have been fitted and additional A.A. armament added. On their trials after reconstruction these ships reached 37 knots.

SPAIN

The 10,670-ton cruiser Canarias has been taken in hand for modernisation following the completion of similar work on the Galicia, Almirante Cervera, and Miguel de Cervantes. The building of the two 'Alaxa' class destroyers which, though ordered in 1936, are still on the stocks, is reported to be proceeding slowly. There is no news of the progress of the nine 'Oquendo' class destroyers ordered in 1947–48.

SWEDEN

Vice-Admiral Stroembaeck, Commander-in-Chief of the Swedish Navy, announced recently that four 600-ton submarine chasers of an all-Swedish design are to be built under the 1950 programme. They will have a speed of 25 knots, are to be fitted with radar and asdic, and will carry "a formidable load of depth charges." Twenty further vessels of this type are planned. Swedish engineers, announced the C.-in-C., are working on a new type of directed torpedo which has a range of 20 miles.

TURKEY

Four American destroyers, the McCallum, Buchanan, Landsdowne, and Lardner, have been delivered to Turkey under the Military Aid Programme. The first two have been renamed Giresun and Geliboli respectively. These are of 1,700 tons displacement and are armed with four 5-in. guns and five 21-in. torpedo tubes. It is hoped to acquire two cruisers and four frigates shortly from the United States.

YUGOSLAVIA

The corvette Partizanska, formerly H.M.S. Mallow, which had been on loan to Yugoslavia since 1943, was returned to Malta during 1949. Three small ex-Italian destroyers of the 'Ariete' class (797 tons), salved by the Yugoslav Navy after being scuttled at Fiume, are being refitted and re-engined. Of these the Ariete herself is in commission.

AMERICAN COUNTRIES

ARGENTINA

The modified 'Flower' class corvette Smilax has been acquired and added to the Argentine Navy under the name of Republica. The minesweeper Fournier, with a complement of 77, was wrecked in the Straits of Magellan on October 3, 1949. There were no survivors.

BRAZIL

The old battleship San Paulo has been relegated to harbour service and is now in reserve. The six new destroyers of the 'Amazonas' class (1,376 tons) have been completed and should by now be in commission.

ECUADOR

Three more patrol vessels have been acquired from the United States, now making five in all. Only one frigate, the Guayas, ex-U.S.S. Covington, was acquired, instead of two as formerly reported.

OTHER COUNTRIES

BURMA

The infant Republic of Burma has acquired a navy. It consists of one frigate, the Mayu (ex-H.M.S. Fal), three M.Ls., 13 H.D.M.Ls., and six motor fishing vessels.

CHINA

The civil war in China has made it almost impossible to gain an accurate picture of the Chinese Navy of today. The cruiser Chunking, formerly H.M.S. Aurora, deserted to the Communist forces, and was afterwards sunk, in March 1949, by the nationalist Air Force. Among other desertions was the destroyer Chang Chih, ex-Japanese Ugi, the largest vessel in the Nationalist Navy. She deserted on September 15, 1949, and was claimed as set on fire and wrecked ten days later. The majority of ships that remained loyal were concentrated at Formosa, though a number of gunboats were engaged in the blockade of Communist ports.

The frigate Lin Fu, formerly H.M.S. Mendip, was returned to the Royal Navy on May 27, 1949.

EGYPT

Six frigates, H.M. Ships Nith, Spey, Usk, Mallow, Mendip, and Whimbrel, have been transferred to Egypt and negotiations for the acquisition of a seventh are in progress. The Whimbrel is, more properly, a sloop of the 1,470-ton 'Wild Swan' class, the Mallow a corvette of the 950-ton 'Flower' class, and the Mendip a 'Hunt' class destroyer of 1,000 tons.

Four fleet minesweepers of the 'Algerine' class are also to be transferred.

P. K. Kemp

CHAPTER XII

THE DEVELOPMENT OF CARRIERS AND THEIR AIRCRAFT

THE FIRST half of the twentieth century has witnessed profound changes in the technique of naval warfare; these have been largely the result of scientific progress in three distinct fields, radio, submarine navigation, and aviation. At the outset, development in each field took place more or less independently, and its application was generally in the form of an aid to operations by the naval forces, whose tactical and strategical functions remained substantially unchanged from those of the nineteenth century. But opportunity and experience in two world wars have fundamentally, though perhaps gradually, been changing the physical character of naval warfare and the ships and weapons which are employed in conducting it. Even in strategy, of which the principles have often been described as immutable, the influence of these new scientific developments has brought some change, most noticeably shown in the steady replacement of independent naval and military commands by combined-service staffs with unified command and new, closely interlocked strategical objectives. In that part of these changes played by aviation, the aircraft carrier and its aircraft have been the dominating factor. For although the influence of those ships was only felt to any appreciable degree during the second of the two world wars, the foundations of naval aviation were laid even before World War I began, and much very important technical progress had been made before it ended.

Only a very short interval of time elapsed between realisation of practical flying (as a means of transport) and the first attempts to adapt aeroplanes for flying from the water, and ships for the operation of aeroplanes. Bleriot made the first successful cross-channel flight in 1909; the first recorded occasion on which a heavier-than-air machine flew from the deck of a ship is believed to be that when an American airman, Eugene Ely, made a successful flight from the United States warship Birmingham at the end of 1910. In the following year a British naval officer flew a British landplane from the forecastle of the battleship Africa when she was moored to a buoy in Sheerness harbour, and Ely advanced the development of the aircraft carrier even further by successfully landing his aircraft on board a warship, on a special platform built over her quarterdeck.

By the end of World War I, however, the technique needed for the reliable and regular landing of aircraft on the decks of ships had still not been achieved; but nevertheless much of the spadework had been done. An official Admiralty account,* written in January 1919, describes in the following words the progress which had been made up to the end of the War towards the attainment of that goal:

> Few of the many naval developments of recent years have given rise to more novel or delicate problems than the introduction of aircraft on board ship. The difficulties connected with the handling of seaplanes, the flying-off

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* A Report by the Director of Naval Construction at the Admiralty.

> of seaplanes and aeroplanes from the deck of a ship at sea, and the alighting of aeroplanes on the ship's deck, exposed to the ever-changing conditions of wind and weather, have only been surmounted (if as yet only partially) by the mutual co-operation of airmen, naval officers, and naval constructors. The great daring of the naval pilot made it possible to carry out experiments, which certainly involved great risks; but without these experiments constructional progress on sound lines could not have been made.

During the 1914/1918 war, when England was subjected to more intensive enemy naval pressure against its sea communications than ever before in its history, progress was made more difficult because (to quote again from that account) of the

> urgent need when war broke out for increased production of the numerous existing types of warships, (and) it was difficult to find the necessary time, labour, and opportunity. . . . Nevertheless much pioneer work was carried out and progress involving remarkable departures in ship construction was made in the design of aircraft carriers.

The evolution of the carrier at this early date advanced in two distinct stages, (*a*) as the seaplane carrier and (*b*) as the ship from which landplanes could be operated. During the first part of the war much progress was achieved with the operation of seaplanes. This type of aircraft was more easily adaptable for various naval purposes than the landplane of that date. The increases in size required for carrying navigation and signalling equipment, armament, and a larger crew gave designers less difficulty with seaplanes than with landplane types and thus eased the problems of landing and take-off. Many vessels were bought or chartered by the Admiralty during the war for the operation and servicing of seaplanes; their size ranged from the small ex-freighter Ark Royal, of 7,500 tons and 11 knots, to the ex-Cunard liner Campania, of 20,000 tons and 21 knots, which could (on conversion) accompany the Grand Fleet at sea with her reconnaissance seaplanes.

Designs for ships to operate landplanes continuously did not appear until the war was well advanced, partly because of the great difficulty of doing this in the days when the accurate control of aircraft in flight was still incompletely understood and when, consequently, the hazards of landing on a ship's small deck were very great, and partly because it was not until about 1916 that the performance and load-carrying capacity of the single-engined landplane were considered sufficiently good to justify their application to fleet duties. About then also development of the fighter plane, as a specialised type, brought with it the call from the fleet for aircraft which could be flown from platforms in all battleships as a means of bringing to an end the operations of the Zeppelin airships which the German navy was using, hitherto almost unchallenged for fleet reconnaissance.

One of the first important advances in carrier design was made in the conversion of the Vindex, a fast passenger vessel of 2,900 tons. She was one of the first of these converted ships to be given a flying-off-deck forward, for the purpose of launching fighters, of which she carried two, in addition to the usual hangar aft for seaplanes, which had to be lowered by cranes on to the water for take-off. Thus the first fighter attack on a Zeppelin, using a ship as base, was made from the Vindex. Though the sortie was not crowned with the success of an air victory, it marked the birth of a new function for naval aircraft. In the same year (1916) a similar ship, the Manxman, was converted, and in her forward hangar four Sopwith 'Pups' were carried. The successful operation of these aircraft was, to quote a naval report, "the first step towards the general replacement of seaplanes by aeroplanes for ship use throughout the Grand Fleet."

The part played by a seaplane, from the Engadine, in locating the German High Seas Fleet before the Battle of Jutland and the success of other aircraft in reconnaissance with the fleet in 1916 impelled the Admiralty to press on with the development of landing-deck carriers. Consequently they decided to stop the completion of the Furious as a mammoth "light cruiser" and to convert her into an experimental aircraft carrier. In her original form as a carrier this ship was only given one deck, that for flying off. But, besides its use for that purpose, this for'd deck was also used for experiments in landing on. After initial success in these, the deck-landing pioneer Squadron Commander Dunning was unfortunately killed and the experiments were stopped. The ship's after turret was then removed and a long landing-deck built abaft the midship superstructure, funnel, and bridge. But even then only a few successful landings were made; the primary cause of these failures was seen to lie in the violent and incalculable wind eddies made by the superstructure. In the meantime a further ship, the Vindictive, was also converted (1917, before completion as a cruiser) to be a similar type of carrier; later, although at least one successful landing was made on her after deck, both ships were again extensively altered.

As it was by then clear that a continuous deck free from obstructions was essential, two further lines of development were pursued, that of the totally clear ("flush") deck in which the funnels were led below deck level to the stern, and the "island" type, in which bridge, funnels, and mast were displaced to the starboard side clear of the landing area. A large passenger ship, Argus, was bought when still on the stocks and reconstructed as a carrier of the former type, and the Chilean battleship Almirante Cochrane converted, in similar circumstances, as a carrier of the island type. Neither ship was ready for service, unfortunately, before the war had ended. During the next few years the Argus was the only British carrier of the deck-landing type, and most of the pioneering work of carrier aviation was carried out in her.

CARRIER AIRCRAFT

The war ended when naval aircraft had crystallised into practical types, but enough experience in their being flown on and off the deck had not been gained for the naval constructors to know the best type of ship from which to operate them. Broadly three types of naval aircraft had, by then, become recognised, reconnaissance, fighter, and torpedo-plane.

Reconnaissance. The first type widely used, or to any extent depended upon in fleet operations, before 1917. At first almost exclusively seaplanes or naval landplanes based at coastal naval air stations. The development of flying off the latter type, the "1½-strutter," from ships in 1918 brought them into the category of fleet aircraft.

Fighters. The specialised type was hardly used in the fleet before the end of 1917, after which date the single-seater Sopwith 'Pup' and 'Camel' fighters were used from launching platforms and available for carrier operation when that became practicable.

Torpedo-planes. The first successful type to be developed was the Sopwith 'Cuckoo.' Their possibilities for harassing the German Fleet at sea and reducing its speed, and thus for preventing a repetition of Jutland, resulted in a large order being placed in anticipation of the conclusion of satisfactory development trials of the Furious, Argus, and Eagle. However, as the Argus, the first carrier to be ready, was not in service until after the armistice, none were able to prove their value against a German warship.

BETWEEN THE WARS

At the conclusion of World War I a far-reaching change in the administration took place by which the Royal Naval Air Service, in whose hands all former naval aviation had been developed, became absorbed into the new and ubiquitous Royal Air Force. This was, as it were, a change of parentage, and the R.N.A.S. became the step-child; its effect was, indeed, complicated, because that part of the Royal Naval Air Service which concerned aircraft-carrying ships, their design, construction, administration, and operation, remained (unaltered) a part of the Royal Navy. The evolution of the aircraft carrier proceeded as before, while the evolution of the carrier aircraft took place in new hands.

For several years the aircraft flown by the Royal Air Force when operating from H.M. ships and coastal bases remained substantially the same aircraft as those which had been designed or adapted by the Navy for naval tasks. Later, however, much of the experience gained by the Air Force as a whole was brought to bear where the design and operation of naval aircraft was concerned. This represented a greater gain for the Navy from the point of view of general flying problems than from the angle of naval flying in particular; in the latter respect the development of the special technique required for naval aviation does not seem to have progressed as effectively as in the United States Navy, where it lay entirely in the hands of naval aviators.

TYPE DEVELOPMENT

The three basic types of naval aircraft, reconnaissance, fighter, and torpedo-bomber, which had emerged from the experience of World War I remained fundamentally unchanged for many years. Their characteristic features were then as follows:

RECONNAISSANCE

This class of aircraft became sub-divided by specialisation into three separate types:

(i) The carrier reconnaissance plane with a crew of three, radio, navigation equipment, and the maximum possible petrol load.

(ii) The amphibian or reconnaissance float-plane—which could take off and land from the sea for operation from seaplane carriers (the Ark Royal and Pegasus remained in service as such after the war) and other warships fitted with a crane.

(iii) Fleet spotter—for operating in naval action and requiring a free view for observing gunfire and the addition of an air gunner not occupied with radio duties.

The principal aircraft of these categories in service before 1928 were respectively:

(i) Fairey III.D and Blackburn 'Bison.'
(ii) Supermarine 'Seagull.'
(iii) Blackburn 'Spotter' and 'Bison.'

FIGHTER AIRCRAFT

After the war Sopwith 'Pups' and 'Camels' were replaced by the Fairey 'Flycatcher,' a single-seat fighter with an improved performance, which would be operated either from the deck of a carrier or as a float-plane under favourable conditions of wind (for the wing loading was higher than that of its predecessors) from flying-off platforms in battleships and cruisers. The 'Flycatcher' was not entirely replaced in service until about 1935.

THE TORPEDO-BOMBER

In 1922 the Sopwith 'Cuckoo' was replaced by the Blackburn 'Dart,' a very successful torpedo-plane which, like the 'Flycatcher,' remained still in service in some ships until about 1935. These aircraft carried an 18-inch torpedo or a load of bombs, and were admirably suited for deck-landing and for the manœuvres used in torpedo attacks in those early days, when anti-aircraft fire was generally most uncertain and inaccurate, short-range weapons (larger than the Lewis gun) almost non-existent, and a risk at sea of interference by fighters believed to be generally improbable. They were single-seat aircraft dependent for their navigation upon either their Squadron Leader's powers of dead reckoning or the assistance of a reconnaissance aircraft.

THE MERGING OF TYPES

About 1930 it became obvious that a single type of aircraft should be adequate for both spotting and reconnaissance, and thus the S/R type emerged. In this capacity the Fairey III.F saw service from 1927 for some eight years. It was not only a very efficient carrier aircraft of greatly improved performance, but it was satisfactorily operated as a float plane when catapults were introduced into the Navy (about 1930) so that battleships and cruisers could carry their own spotters.

Almost simultaneously with the appearance of the Fairey III.F, the 'Dart' was succeeded by the Blackburn 'Ripon,' a two-seater capable not only of self-navigation but also to some extent of self-defence. The designs of both this aircraft and the III.F were made possible by the advent of an aircraft power unit, the Napier Lion water-cooled engine, which had earned world-wide fame in the Schneider Cup and many other fields.

About the year 1931, however, a further extension of type amalgamation took place. The addition of more carriers to the fleet brought more appreciation of the value of both reconnaissance and strike (torpedo-bomber) aircraft. Hence the conception of the Fairey 'Swordfish' torpedo-spotter-reconnaissance aircraft, which came into service in 1935 and finally replaced all separate types for those duties.

An important step in aircraft development had, however, taken place some three years before this, namely, the conversion of the water-cooled-engined III.F and 'Ripon' aircraft by air-cooled-engined versions of each, namely, the Fairey 'Seal' (S/R) and the Blackburn 'Baffin' (T/B). New experience in the operation of carrier aircraft in the relatively hot climate of the Mediterranean called for the use of air-cooled-engines for long-range aircraft. By a strange coincidence the air-cooled-engined (Fairey) 'Flycatcher' began to be replaced, in 1931, by the water-cooled (Kestrel) engined (Hawker) 'Osprey' and 'Nimrod' fighters (two-seat and single-seat respectively).

About 1934 the merging of types had advanced so far that the Admiralty considered it was able to meet all naval requirements with two types of aircraft—the newly acquired T.S.R. and a new type of aircraft, the fighter reconnaissance (F/R). These two types were intended to meet all carrier duties with normal wheel undercarriages and catapult-ship duties as float-planes, for conversion to which form both types were designed. A recent decision had been made to fit all capital ships and cruisers with catapult launching gear.

T.S.R. AIRCRAFT

The Fairey 'Swordfish' enjoyed the honour of being the mainstay of British naval reconnaissance and strike operations almost until the end of World War II. It was an outstanding reliable aeroplane, an excellent deck-lander, had a most remarkable load-carrying capacity, and was even a most successful dive-bomber. Though by wartime standards it had no great top speed (about 125 knots loaded), rate of climb, or service ceiling, it could be relied upon to reach its target at relatively great distances from its base, and this it often did, particularly at night, in the face of considerable opposition; its outstanding manœuvreability and good handling qualities made this possible. The 'Albacore,' its intended successor, had a slightly superior all-round performance and the particular merit of enclosed cockpits. But it was never produced in large numbers, since its introduction into the service on a scale large enough to replace the Swordfish would have involved a quite unacceptable postponement of the production of the new torpedo-bomber-reconnaissance monoplane ('Barracuda').

FLEET FIGHTERS

About 1931 the (Hawker) Hart-type fleet fighters, 'Osprey' (two-seater) and 'Nimrod' (single-seater), began superseding 'Flycatchers' in the aircraft-carriers. In accordance with a new principle, namely, that of providing our cruisers with a reconnaissance aircraft which could do combat if necessary to secure its information, the 'Osprey' (as the fighter reconnaissance aircraft) became the standard aircraft for cruisers. It was intended that in war, when their operation on floats would seem unlikely to be practicable, these aircraft should be embarked as 'one-shot' fighters, spotters, reconnaissance aircraft, or even bombers (they were fitted for carrying 250-lb. bombs), to "do and die"! Or they might land on the deck of a carrier or ashore, for refuelling and further operation if circumstances allowed. But none were still in service when World War II broke out, though this "one-shot" principle was, indeed, an essential feature of the wartime C.A.M. (catapult-aircraft merchant) ship operation of 'Hurricane' fighters when the latter were used against the German Focke-Wulfe 'Condors' in the protection of Atlantic convoys in 1941 and 1942.

It was intended that the 'Osprey' and 'Nimrod' should be replaced by 'Skuas,' the Navy's first monoplane, which was in fact designed to combine the roles of fighter, reconnaissance, and dive-bomber: these replacement aircraft were to include the 'Skua'-variant 'Roc,' which was purely a turret fighter. But there were many serious delays in completing the trials and subsequent production of these aircraft, which were largely the result of the designer's difficulty in meeting necessary naval requirements in a monoplane. As a result the first 'Skuas' did not come into service until 1939, and it was obvious, with the war looming up, that some of the older naval fighters must be replaced by the adaption of an existing Air Force fighter. The 'Gladiator' was chosen, very slightly modified, and at the outbreak of war provided about half of the naval fighter force. The prejudice against single-seat fighters (which had grown up of late years on account of navigational difficulties before the practical introduction of radio and radar in H.M. ships) was, however, soon forgotten when, in the Mediterranean and Home Fleets, the 'Gladiator' showed what the single-seater could do; climb and manœuvrability were among the factors found to be of greater importance than ease of navigation in the face of German and Italian air attacks on the Fleet.

IMPROVEMENTS AND NEW PROBLEMS IN NAVAL AIRCRAFT DESIGN

Slots, invented soon after World War I, were a great help towards making deck-landing safer, particularly while passing through the uncertain air stream near the stern of the carrier, by delaying the stall. Safety in deck-landing was further increased by two more improvements to aircraft which followed the introduction of slots, namely, the introduction of wheel-brakes and flaps; the former would have been of particular value after 1925, when the original types of arresting gear had been abandoned and before the present type was universally fitted. As aircraft speeds grew higher so did their stalling speeds and the risk of rolling too far along the deck, and so over the bows or side; but the introduction of wheel-brakes did not in fact take place much before that of the new transverse arrester wires. The introduction of flaps enabled aircraft to fly at lower speeds in the approach and thus again reduced the risk of overrunning the deck.

With the increasing speeds, take-off also became a difficulty, and during the early 1930's loaded aircraft required the maximum possible length of deck for their take-off run, as well as the maximum carrier's speed through the water. This take-off problem was partially mitigated when flaps were fitted, since maximum lift was thereby increased at low air speed and thus the minimum take-off run reduced. The greatest improvement in take-off, however, came with the introduction of the variable-pitch and constant-speed propellers with which modern types of aircraft were beginning to be fitted at the end of the inter-war period. This device, with the increased thrust available at lower air speeds, provided improved acceleration and thus again a shorter take-off run. Few naval aircraft, however, enjoyed those advantages before the beginning of World War I.

One of the most important engine improvements was the introduction of superchargers, which enabled engine power to be increased above what was otherwise possible as height above sea-level was gained in flight. The last year or so before World War II also saw the introduction of enclosed cockpits, which had hitherto been almost unknown in single-engined naval aircraft; the longer flights demanded by naval reconnaissance and search made this a very important gain for the efficiency of aircrews. Finally, the introduction of homing beacons in carriers, with receiving apparatus in carrier planes, greatly added to the value of the latter, especially in the weather conditions usually found in the North Atlantic and North Sea.

Designers have always hesitated to increase the wing loading of naval aircraft because it added to the risk of overrunning the deck on landing, and of failure to get airborne in take-off. This problem was, however, solved partly when the later type of arresting wire was introduced, beginning about 1932 (noticeably later in British carriers than in those of the United States), and partly when catapulting was introduced to assist take-off. The danger of accident during landing was greatly reduced by arrester gear. Safety during landing was still further increased by the introduction of "Batting," a system of controlling the pilot's actions from the carrier's deck, it being generally recognised that an observer on deck could see more easily than the pilot (especially when inexperienced) when an aircraft's approach needed correction.

Other major problems for the naval aircraft designer at this period were those of:

(*a*) the aircraft's *dimensions* (for economy of hangar space, and for take-off and landing clear of deck obstacles);
(*b*) its *strengthening* to meet the violent stresses imposed by deck landing and catapulting;
(*c*) whether it should be a *bi-plane* or *monoplane*; and
(*d*) whether it should be *twin-engined.*

The necessity for small span and weight and for simplifying maintenance on board ship, among other reasons, resulted in delaying the introduction of the monoplane and of twin-engine types. The Blackburn 'Skua' two-seater fighter was the Navy's first carrier monoplane, coming into service in January 1939, the problem of its hangar stowage being solved, as in the case of many later British and American ship monoplane designs, by the use of a swivelling mechanism for wing folding. The problems of a larger monoplane for torpedo-bomber and reconnaissance duties had not been solved early enough for this type to come into service before the 'Barracuda' in 1943.

CARRIER DEVELOPMENT BETWEEN THE WARS

By the time World War I had ended most of the preliminary work, experiment and trial in the first stage in the carrier's evolution was complete. Two main types of carrier had emerged, the island type as represented by the Eagle, then under construction, and the flush-deck type as represented by the Argus. The following general principles had also been determined, namely:

(i) that, for deck-landing, a continuous flight-deck was necessary to obtain smooth air flow, so vital for safe landings;
(ii) that aircraft must be stowed with complete weather protection in hangars below the flight-deck; and
(iii) that aircraft lifts must be provided between the hangar and flight-deck.

Two important problems, however, remained; the first whether island or flush-deck—in fact, how to dispose the navigating position, mast, and smoke uptake, so as to cause the least interference with landing operations; the second, that of satisfactorily "arresting" a landed aircraft. Trials with the Argus and reconstructed Furious (as a flush-deck carrier) were continued with great success, while the Eagle and the Hermes (the first British carrier to be constructed as such from the keel plate up) were completed as island carriers and were similarly very successful in deck landing. The island type finally gained popularity, principally because it much simplified ship command and signalling, and also it cleared the funnel gases better from the track of an approaching aircraft. During the second war, however, the flush-deck type was favoured for the first escort carriers, presumably because of its greater simplicity in construction, but it was later abandoned in favour of the island type. It seems likely, however, that if future aircraft-carriers are to be designed for the operation of large bombers the flush-deck will again come into its own on account of the wide wing-span of the bomber.

During the later years between the wars increasing experience in the operation of carrier aircraft led the constructors to seek every possible means of increasing the number of naval aircraft which could be satisfactorily operated from each ship. This is, indeed, still a most vital matter, since it is not purely a question of economy in carrier keels but is in some respects necessary for the simplification of diverse operational problems. For example, two carriers each carrying only 36 aircraft (e.g. 'Illustrious' class) demand a greater surface escort strength than a single carrier with 72 (e.g. Ark Royal (1935)). Between the wars, indeed, probably the largest factor impelling the constructors to design for maximum capacity was the Washington Treaty limitation on the individual and gross carrier tonnages allowed. Pulling the other way was the very wise British Admiralty decision in 1935 to armour carrier hangars, which fact accounts for the discrepancy in capacity between the Ark Royal (and even more the United States carriers) and the Illustrious types.

An important step for increasing a carrier's capacity was the introduction of the "crash barrier," an effective wire-net division between the landing and the post-landing parking spaces. This device not only permitted a much higher rate of deck-landings during operations, because it obviated the delay of lowering a landed aircraft into the hangar and of raising the lift again before the next landing could be made, but it enabled a carrier to embark and operate a greater number of aircraft than could be stowed within its hangars.

SOME CARRIER IMPROVEMENTS

Before the introduction of the crash barrier the fitting of arresting wires was one of the most valuable improvements in carrier operation; not only did it increase the safety for the landing of aircraft, but it also resulted in greatly reducing the wear and tear on carriers' boilers and machinery, since it then became no longer necessary for them to work constantly at their maximum power. Moreover, the safety with which carriers could be operated in war was also increased by this means, since it reduced the time occupied by the landing of each aircraft, and thus the time the carrier would be on a steady course; this was often one which was not convenient to the fleet.

It must be recognised that in all the problems of carrier and naval aircraft design there is a great difference between the carrier's useful life and that of any particular type of naval aircraft; in practice, the ratio in years is probably about 4:1. The result of this is that carrier aircraft usually have to be designed within limitations imposed by hangar space, length of deck, and speed, which inevitably remain unchanged for many years, while a very considerable amount of intelligent anticipation of future aircraft designs is required on the part of the naval constructors when considering plans for any new carrier.

DEVELOPMENT UNDER MODERN WAR EXPERIENCE

In September 1939 the British Fleet found itself with carriers which, except for the Ark Royal, were ships of some 20 years of age. Besides her, one only, indeed (the Hermes), had been designed as a carrier in the first instance. Nevertheless, much valuable experience, coupled with surprisingly accurate foresight, had been put into the completion of these ships in their carrier's guise. The Ark Royal herself, indeed, embodied all the lessons learnt by the constructors between 1914 and 1930. In the general features of their design for the operation of aircraft, war experience showed a surprisingly small field for improvement. There were naturally, however, many small points where war experience and the happy collaboration between the British and American Fleets resulted in improvements being made, especially in the aviation equipment in the carriers. In only two important directions did principle have to be modified. Of these the first was that of the obvious need to be able to operate larger numbers of aircraft in each of the British Fleet Carriers; the 36 aircraft carried in the 22,000-ton 'Illustrious' class, prior to the introduction of "deck-parks" in British carriers, made a poor showing beside the 70 or so in the U.S.S. Ranger of only 15,000 tons. True, the Illustrious possessed vital protection for herself and her aircraft in the shape of an armoured hangar, and this feature of their design should not be under-estimated, since it saved all the British fleet carriers from the effects of suicide bombing attacks in the Pacific, while the loss of many American carriers was suffered from that cause. But there was room for improvement without loss of armour, and the difficulty was being met with some degree of success by the end of the war. The introduction of the crash barrier, which enabled a permanent "deck-park" of aircraft to be carried during operations was the solution which offered the least difficulty of any.

The second direction in which an alteration of policy was vitally needed was for the construction of ocean-going escort carriers in large numbers. Optimism that the German Navy would not transgress the international agreement on the use of submarines, and perhaps excessive faith in the anti-submarine technique which was in existence before World War II began, seem to have resulted in the belief that escort carriers would not be required, or at least that they should have a low priority among naval requirements. Albeit the year 1941 proved otherwise. Curiously, the construction of such vessels, which were ultimately to have such large influence in the anti-submarine war, began with the demand for the fighter protection of convoys against German aircraft attack; the first escort carrier, the converted ex-German prize Hanover, then H.M.S. Audacity, was completed in 1941 to fill this requirement, and carried a complement of six single-seat fighters ('Wildcats'), which were in no sense originally provided for anti-submarine work. The project had indeed been initiated as early as December 1940, when the Focke-Wulfe attacks on shipping in the Western and North Western Approaches were becoming critical and could not be met by existing shore-based R.A.F. fighters.

The Audacity's success not only in shooting down enemy bombers but also in locating and securing the destruction of enemy U-boats gave the final encouragement for providing this new type of ship in large numbers; by the date when the Audacity was herself torpedoed at night by a U-boat (December 1941) the submarine had become an even more serious menace to shipping than the bomber, and the practicability of the conversion of medium cargo ships for use as anti-submarine escort carriers was very clearly seen. Before the war had ended five more merchant ships had been converted in British yards. The much greater numbers required, however, could only be provided by the immense shipping and shipbuilding resources of the United States. The first of the American conversions were five diesel ships of about 13,000 tons displacement (after conversion), which were received by the Royal Navy during 1942; they were designed for operating six 'Martlet' or 'Hurricane' fighters and nine 'Swordfish' each—their speed was about 18 knots. A further 33, steam-turbine-propelled, were delivered between December 1942 and the end of the war, being slightly larger in carrying capacity and having many improvements as the result of experience with the earlier type.

Only six British fleet-type carriers were completed for service during the war—ships of 22,000 tons of the 'Illustrious' and 'Implacable' types, whose features and size were generally the same as those of the Ark Royal, except that having armoured hangars and sides they had only a half of the aircraft carrying capacity. These were the Illustrious, Formidable, Victorious, Indomitable, Implacable, and Indefatigable.

Economy of shipbuilding materials and skilled labour, as well as shipyard space, was after 1941 being rigorously applied to all naval building on account of the most urgent needs for both repair and new construction of the mercantile fleet. The Admiralty hesitated to construct the greatest types of fleet carrier, and in order to meet immediate fleet, as opposed to escort, requirements designed a new class, the light fleet carrier, shorter, smaller, and slower ships (25 knots) than the 'Illustrious' class, but able to operate some 30–35 modern aircraft apiece. The first ships of this class, Colossus, Glory, Venerable, and Vengeance, were not completed until the war was ending, and little practical experience of them was thus gained. But the class has been continued, and provides, perhaps, the "poor man's" solution to one carrier problem.

NAVAL AIRCRAFT AT THE BEGINNING OF WORLD WAR II

While the quality, if not the numbers, of British carriers at the beginning of the war was very adequate, the Navy's aircraft were often criticised. Of the two main classes of naval aircraft the torpedo-bomber-reconnaissance and the fleet fighter, all of the former (which, in fact, represented about four-fifths of the Navy's total) and half of the latter, were bi-planes with fixed undercarriages, fixed-pitch propellers, open cockpits, and were therefore in many respects apparently obsolescent. The fleet's only monoplanes, the 'Skuas' and 'Rocs,' were of relatively low performance. Nevertheless, all these aircraft proved their worth, and came most successfully through almost countless operations. The 'Swordfish,' in fact, was the principal reconnaissance and anti-submarine aircraft of the fleet throughout the war, and in its offensive capacity as torpedo- and dive-bomber and minelayer (in enemy waters), it continued to achieve successes in the two main theatres of war, the Atlantic and Mediterranean, until the date when the British Fleet joined issue with the Japanese in the Pacific. The reason is clearly that this aircraft was of fundamentally sound design for filling the roles for which it was intended, and that in these roles its action was mainly that of a naval operational unit rather than that of an air combat unit; in fulfilling these purposes enemy air opposition was rarely met with and, indeed, that condition may be repeated in some measure should another naval war take place.

The 'Albacore' had been intended to replace the 'Swordfish,' of which it was but an improved version, but in 1937 the Admiralty had decided to obtain a monoplane torpedo-bomber, the 'Barracuda.' The production of this aircraft underwent many vicissitudes, the principal of which was the diversion of materials and labour during the anxious periods of 1940, when most resources needed for aircraft construction were concentrated for the defence of Britain and retaliatory bombing programmes. These delays also affected the 'Albacore,' and it soon became clear that nothing was to be gained by producing the latter if it meant delaying the 'Barracuda.' Hence but a few were produced and the 'Swordfish' squadrons soldiered on, being gradually replaced from 1934 onwards by 'Barracudas.'

In the meantime, however, it was obvious that there were certain purposes for which a much higher performance aircraft than the 'Swordfish' was needed; for example, in long-range strikes against targets where opposition was expected to be severe and where the enemy was certain to be warned by radar. The Navy therefore borrowed* 'Avengers' from the United States to fill the gap before the 'Barracuda' could be ready. Among other tasks on which this aircraft was employed was that of supplementing the 'Swordfish' in the protection of Atlantic convoys; it was found very often that the 'Swordfish' was too slow to reach and attack German submarines after first sighting them. The 'Avengers' speed gave them the advantage on such occasions, and also when the U-boats decided to hit back with anti-aircraft fire.

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* Lend Lease.

From 1943 onwards 'Barracudas' were used with many successes in the long-range strikes, notably against the Tirpitz, and other Norwegian targets, where the German defences were very active, and against Japanese land targets in the Malayan area and later nearer Japan. They were superior to 'Avengers' as dive-bombers and fast enough to make these operations practical, because they could often then be accompanied by modern fighter escorts.

NAVAL FIGHTERS

The lamentable state of the naval fighter forces at the outbreak of war only became fully recognised in the Norwegian campaign, when neither in their performance nor in the numbers available were they properly equal to the task of supporting the military expedition. These deficiencies became even more marked during the summer months of 1940, when in the Mediterranean the Italian Air Force attacked our fleet with relative impunity. Fortunately an eight-gun fighter of relatively good performance, the Fairey 'Fulmar,' which had been ordered (about two years before the war) as a replacement for the 'Skua,' started coming into production during the latter part of that critical year. When the newly commissioned Illustrious with her armoured flight deck and her squadrons of 'Fulmars' arrived in the Eastern Mediterranean in September 1940 the tables were completely turned against the Italian Air Force. Fortunately this change had also coincided with the realisation of practical "fighter direction" in the Fleet. The performance of the 'Fulmar,' however, was not good enough, nor the rate of production fast enough, to meet naval requirements before the earliest possible deliveries of either of the two most recently projected naval fighters, the 'Firefly' and 'Firebrand.' At the end of 1940, therefore, the Navy placed orders for the United States' naval Grumman fighter (the 'Martlet' or 'Wildcat'). This was the most easily available because, being designed for carrier work, it required no modification for naval use, and being American built its supply to the Navy did not endanger supplies from British sources to the R.A.F. Though well armed (four, and later six, 0·5-inch Colt guns) its performance was in some respects behind that of the R.A.F. 'Hurricanes,' and in most behind that of the 'Spitfires,' upon which the Navy's eyes were enviously turned. But in the following year many 'Hurricanes' were modified for naval use, and during 1942 and 1943 the 'Spitfire,' converted to 'Seafire,' replaced it as the standard British naval fighter.

'Seafires,' however, though used with great success in many theatres until the end of the war, had not been primarily designed for carrier work, for which they were hardly robust enough, nor was their bare hour of patrol endurance adequate. United States naval 'Hellcats' and 'Corsairs' were therefore obtained in large numbers during the last two and a half years of war; by their performance, gun-power, and the great advantage of having been fashioned from the start to meet the stringent structural requirements of catapult take-off and arrested landings, these two types of single-seat fighter, together with the less effective 'Wildcats' (of later marks) proved the mainstay of the naval fighter tasks undertaken by both British and American carriers in Atlantic and Pacific Ocean operations.

The first war-built British naval fighter, the Fairey 'Firefly' hardly came into service in time to prove its qualities; this two-seater four-cannon fighter was the first British naval aircraft of the fighter type to have been designed and built *ab initio* for meeting the specialised conditions and requirements of comparatively modern naval operations.

POST-WAR DEVELOPMENTS

The process of producing a new naval aircraft from the drawing-board to fully operational status is necessarily slow; it takes from five to seven years, and sometimes longer. Neither the British nor the American Fleets had aircraft in normal production which had reached that status from post-1939 design before the last year of the war. The 'Firefly' was just coming into service when the war ended, the 'Firebrand' (first designed as a single-seat fighter and later converted to torpedo-strike aircraft) was still delayed; detailed requirements for both had been stated by the Admiralty early in 1940, and before much real war experience had been gained.

It has fallen therefore to the economy-restricted staffs of post-war days to test and develop the aircraft and carrier equipment which active service experience of even the comparatively early war operations demanded. Much progress has, nevertheless, been made. Gas turbine-engined and jet-propelled aircraft (for example the de Havilland 'Vampire,' the Supermarine 'Attacker' and the Hawker 'Sea Hawk' fighters) have already been tested in deck-landing and ship operation with success. The first twin-engined aircraft ever to be designed solely for the British Navy's carriers, the Short 'Sturgeon,' may also soon appear in a training role in service. On the carrier development side, experiments in landings with the "flexible deck" (which allows the undercarriage to be dispensed with) and numerous efficient carrier types of 'blind-landing' aids are continuing. Besides the addition of several new and improved light fleet carriers to the fleet, the larger fleet carriers Ark Royal and Hermes are nearing completion. But financial economy now binds the hands of those who are undoubtedly the most vital agents in all development, the personnel who have to gain experience by the constant operation and flight of naval aircraft at sea, for the numbers of naval aircraft flying must necessarily be scaled down to the proportions of the present small active fleet.

"VOLAGE"

CHAPTER XIII

SUBMARINE AND ANTI-SUBMARINE TODAY

In order to understand the true extent of the revolution in submarine and anti-submarine warfare during the last seven years, since the development of the schnorkel apparatus and the comparatively high submerged speeds achieved in some German U-boats at the end of World War II, it is necessary to review the development of the submarine and its counters.

The Hague Convention of 1899, convened at the instigation of Russia with the object of limitation of armaments, failed to reach agreement on the prohibition of submarines as a weapon of war, although the ban on "the casting overboard of explosives from balloons" was as unanimous as the spirit of the ban was promptly discarded in the war of 1914–18 and subsequently. In 1900 the only Powers with experience of the submarine were the French and the Americans, both continental nations with long seaboards. France was at that time still regarded as our traditional enemy, and as it was obvious that we should get no information from her as to their latest developments, we turned to America for our original models.

Development from the 'Holland' class was steady. By 1904 Great Britain was in a position to carry out exercises using 'A' class submarines as a defence against an enemy Fleet closing our shores. Unfortunately A.1 was sunk in collision, while submerged, with a merchant vessel during the exercise, and no further fleet exercises using submarines took place for over four years.

At this time submarines were generally regarded purely as coastal defence forces, "mobile minefields" to improve on the moored variety, which had until the advent of the submarine been in the capable hands of the Royal Engineers. Warship defence against the torpedo was the net, while the ram was the counter to the submarine. These rather restricted views were not held by submarine officers, as Lieutenant-Commander M. K. Horton sought to prove in a fleet exercise when he dived his submarine right up the Firth of Forth and torpedoed a ship at anchor above the Forth Bridge. This faith in the potency of the submarine as a weapon of war came to full fruition in the Second World War, when, as Admiral Sir Max K. Horton, G.C.B., D.S.O., this officer commanded the submarine branch of the Royal Navy for nearly three years, followed by a similar period as Commander-in-Chief Western Approaches, the mainspring of the anti-U-boat campaign.

Such was, broadly, the position at the outbreak of war in 1914, by which time submarines in all maritime countries had developed the diesel engine for surface propulsion and had increased in size to the extent of becoming an ocean-going weapon. Thus the range of the "mobile minefields" by which it was hoped to deny certain stretches of water to the enemy fleet had been greatly increased. Anti-submarine measures remained largely unchanged, except that the aircraft and dirigible airship were in process of speedy development.

The breaking of International Law by German U-boats during World War I, led to great strides being made in anti-submarine measures. By the time of the armistice the hydrophone and the depth-charge had been well developed as methods of detection and destruction of submarines by surface vessels. Many other methods of locating and destroying U-boats had been tried; deep mines had been laid in quantities, net barrages constructed, drift nets streamed across the probable routes, while sea-planes and dirigibles were armed with bombs up to 100 lb. in weight. Depth charges were not fitted to aircraft, but nearly every type of small surface warship carried them and they had been tried, unsuccessfully, in certain classes of submarines for surface work. All sorts and conditions of commercial shipping—trawlers, drifters, yachts, and "Q-ships"—had been commissioned into the Royal Navy as convoy escorts or for anti-submarine patrols, their low speed being accepted in view of the similar disability in submarines when submerged.

These various forms of attack resulted in the destruction of 163 U-boats: 28 by patrol craft, 24 by convoy escorts, 48 by mines, 17 by submarines, 14 by "Q-ships," 9 by other means, 23 from unknown causes, 18 were lost as the result of accident, and 6 interned, making a total of 187.

On the submarine side the chief improvements in attack facilities were improved periscopes, longer-ranged and more accurate torpedoes, and better plotting instruments. Evasion of surface vessels was aided by the fitting of hydrophones (not always of great accuracy). Surface speeds and radius of action had been improved, but submerged speeds and endurance remained much the same as pre-war, except in the small British 'R' class, which was especially designed for submarine versus submarine work.

During the year between the two world wars the asdic, which had made a tentative start in the latter part of 1918, was steadily developed. An anti-submarine school was formed where not only the technical side of methods of combating the activities of submarines was studied, but also the tactics of this form of warfare. Realising the narrowness of our victory over the U-boat, strenuous efforts were made by Great Britain to induce all other nations to agree to the prohibition of submarines as ships of war, but neither the Washington Conference nor the subsequent one at London achieved more than a limitation of numbers of submarines, together with other types of warships, which any one nation might possess. Fresh rules for submarine warfare were drawn up by which submarines were brought back to the same limitations as in 1914, but these were never ratified by all the nations concerned. Thus they had not the full force of International Law, although the majority of nations had undertaken to respect them, including Hitlerite Germany in 1939.

These restrictions, together with the increased use of naval aircraft, appeared to make the use of submarines, either against merchant shipping in convoy or against single ships in waters capable of being covered by air patrols, impracticable. Consequently in 1939 British submarines had not been trained in attacking merchant ships and their sea exercises had been confined largely to reconnaissance work or in attacking a fleet screened by anti-submarine destroyers. Economy had restricted the speed of ships exercising, with the result that the technique of attacking high-speed targets at sea was rarely worked out, whatever practice may have been given under the unrealistic conditions of the "attack-teacher" on shore. Torpedoes, but not their pistols or warheads, had been improved, attacking instruments were better, and the asdic, now fitted in submarines, had proved to be as much of a help to the submarine as it was to the surface ships. Size, range, and habitability had improved, but submerged performance remained the same in 1939 as in 1919, while the surface speed was, if anything, slightly reduced. Anti-submarine warfare development had been largely confined to surface ships and habour defences. Aircraft, although vastly improved in performance and fitted to carry heavier bombs, had no further counter to the submarine. This situation was roughly the same with other maritime nations, except that Great Britain had a very definite lead in anti-submarine material, such as it was.

With the outbreak of war in 1939, the deterioration in adherence to the rules of seawarfare was as certain as in World War I, but the process was far quicker and more drastic. International Law in time of war usually becomes reduced to a state where the breaking of it by one belligerent frequently necessitates reciprocal action by the other, even if only from motives of self-preservation. There are, of course, other considerations as well. By the end of 1939, Germany, although observing the rules of the game to start with, had lapsed into unrestricted submarine warfare at sea, an example promptly followed by Italy immediately on her entry into the war. We ourselves gradually came to the state of regarding all enemy merchant ships as supply ships and therefore engaged in war-like activities. The invasion of Norway immediately led to the establishment of a "sink-at-sight" zone and was soon followed by others in the Bay of Biscay and the Mediterranean. From July 1940 the extension of these sink-at-sight zones was steady, but was limited to the minimum required operationally to enforce our declared policy. That this drift into total war obtained without serious opposition may be partly attributed to the failure to obtain agreement in time of peace on restrictions on air warfare. The bombing of towns and similar operations had been execrated during the Spanish Civil War, but, continued as it was during that period, was condoned and finally accepted during World War II.

The rise and fall of U-boat power during the first five years of World War II is well known. The causes of the eventual superiority of Allied anti-submarine over the U-boat operations were many and varied. History is still too much in the raw to be able to form definite opinions as to in which particular factor lay the predominant influence. In an Admiralty paper (Command 6843, published in June 1946) a list of all enemy U-boats destroyed during the Second World War was given. The results are summarised below, but, without knowing the total strength of the various anti-submarine forces engaged, it would be invidious to attempt a comparison of the relative efficacy of these forces.

Broadly it may be said that, due to lack of Allied air and surface anti-submarine force, U-boats were, in the first years of the war, able to utilise their surface mobility to the full, both in attack (by the tactics of night attack on the surface following daylight shadowing on the surface), and in evasion by escape on the surface, where their surface speed was frequently higher than the effective speed of many of the British escort craft. The increase in the number of surface anti-submarine craft with adequate speed and sea-keeping qualities, backed by better methods of detection

	Germany	Italy	Japanese	Total
Ships	246	37	70	353
Shore-based aircraft	246½	9	4	259½
Ship-borne aircraft	44	1	8	53
Ships and shore-based aircraft	32	5	4	41
Ships and ship-based aircraft	14	Nil	5	19
Submarines	21	19	25	65
Bombing raids	63	3	Nil	66
Naval mines laid by aircraft	16	Nil	3	19
Naval mines laid by ships	16½	Nil	1	17½
Other causes	82	11	10	103
Total	781	85	130	996

and improved methods of attack, helped in great measure to force the U-boat underwater and so deprive it of much of its mobility and endurance. This, strengthened by vastly improved air warfare in more and better aircraft, both land-based and sea-borne, and equipped with depth-charges, radar of rapidly improving quality, search-lights, and tremendous improvements in navigational methods and equipment, bade fair to eliminate or at least defeat the submarine menace by the end of 1943. The use of the acoustic or homing torpedo by the Germans was quickly countered.

Thus the improvements in anti-submarine warfare drove the U-boats away from our convoys by decreasing their mobility, and by improved tactics and weapons kept them under water and hunted them to exhaustion both of crews and submerged power. The knowledge of all this set the German High Command a sore problem if the U-boat warfare on which they had pinned so much of their faith and expended so much of their war potential was to continue to be effective.

Two quick answers suggested themselves. For some years prior to 1940 the Dutch Navy had been experimenting with improvements in the extensible induction and exhaust pipe, which had been fitted to many early types of submarines but which was later discarded. By 1940 these experiments had reached an advanced stage and the result was fitted to a Dutch submarine of the 'O' class building at Amsterdam. This submarine was captured by the Germans during the over-running of the Low Countries, completed, and used for training purposes. Developments of the extensible tube were put in hand and the result, in the form of the "schnorkel" or "snort," was soon in mass production. This device enabled the U-boat to proceed submerged at a continuous speed of up to 6 knots in normal weather using its surface engines, and so both conserving its battery power and providing the crew with ample fresh air without exposing itself to detection by either optical or radar instruments except for the small schnorkel head with its automatic safety valves. Wireless reception submerged had already become an everyday practice, while radar and hydrophones gave ample warning of the enemy's approach. There was therefore no real need for a submarine so equipped to proceed on the surface from the time it left its base to the time it returned. Periods of total submergence of over a month became commonplace.

The second palliative lay in increasing the size and power of the electric batteries at the expense of the surface engines and, together with extensive streamlining of the outer hull and the surrender of the gun and a percentage of bridge habitability, so to increase the submerged speed to a theoretical 16 or 17 knots for short spells. These conditions were fulfilled in the German type 'XXIII,' a small submarine which, rapidly produced by prefabrication methods, operated unsuccessfully off the east coast of Scotland in the closing stages of the war. These type 'XXIII' submarines were, in fact, inferior in performance to our own 'R' class submarines which were produced in 1918 for anti-U-boat work. Thus there was nothing inherently new to us in either of these developments, although we were not prepared with an efficient and immediate counter.

What was new and revolutionary in German minds was a new type of U-boat which had not passed the experimental stage by the time of the surrender of Germany to the Allies. Briefly, this was the true submarine, as opposed to the submersible ship. By an entirely new design of propulsive machinery and fuel, this vessel was designed to achieve a continuous speed submerged of over 20 knots. There was no exhaust to the outside of the hull and no need for the vessel to come to the surface, and so betray its presence, for any purpose whatsoever. Radar therefore became inoperative against it while its speed submerged, capable of being sustained for long periods without any quick exhaustion of power or influenced by surface weather conditions, gave it the legs in open waters of any but our fastest and most powerful destroyers. Thus the vast majority of our anti-submarine surface craft would have been powerless to hunt it, while our aircraft would have been unable to locate it. The chances of locating such a vessel with the anti-submarine devices available to us at the close of World War II before it delivered its attack or of attacking it afterwards were practically nil. According to statements in Parliament by the First Lord of the Admiralty no submarine of this type has yet been produced in an operational form by any nation, but there can be no doubt that the true submarine on the lines of the German experiment is not outside the competence of naval science or that many nations are working on this problem.

In studying modern submarine and anti-submarine warfare, this question of permanent submergence and high operational speed is a most important factor. Taking the subject of submarine warfare first, it is necessary to consider the duties demanded from submarines by different nations. Great Britain is faced at present with only one potential enemy. This is a continental nation almost if not entirely free from the necessity of getting supplies from overseas sources and with little necessity for coastal traffic unless he overruns other countries in his desire for ports from which to operate his own naval forces.

Blockade and destruction of the enemy supply lines at sea can therefore be ruled out of our considerations. On the other hand, we shall, as always, be tremendously dependent upon sea-borne supplies both to our own island and to such parts of the European continent as we still retain as allies, and our potential enemy is known to have large numbers of submarines, both coastal and ocean-going. Also he is reported to have embarked on a large and rapid expansion of this submarine force, and it is logical to suppose that a proportion of this force will be, in due course, the modern submarine (with continuous high speed and prolonged submerged endurance) and will be used extensively against our sea-borne supply lines.

The large number of enemy submarines demands a large anti-submarine force, both surface and air, on our side. This force in turn will require large numbers of submarines as targets both for initial training and the subsequent maintenance of efficiency. Included in this requirement will be submarines for experimental and testing purposes, both submarine and anti-submarine. Many of this force will have to be modern submarines if both training and exercise are not to become unreal. This clarifies the submarine role. Modern submarines will be required for anti-submarine operations and also for training purposes, while the present type of submersible will carry out reconnaissance duties and training. The previous system of allocating only old and obsolescent craft to the training flotillas in war time will have to be abandoned if the all-important matter of training and development is to be efficient. Without efficient training, ships and submarines cannot operate efficiently.

From the point of view of anti-submarine warfare, it may safely be left to our scientists to find methods of detecting the true submarine both from surface ships and aircraft, although this cannot be fully tested until this type of submarine becomes a reality.

Other factors, however, come into play which cannot be conquered by science alone. In both world wars it has been the practice of all maritime nations to reinforce their peace-time anti-submarine forces by the use of large numbers of medium-speed small ocean-going merchant vessels, such as trawlers, drifters, and yachts. The Italians, not having many of these at their disposal, used small trading schooners fitted with auxiliary engines for anti-submarine patrols. As the war progressed it was possible to produce *en masse* the sloop type of warship having good sea-keeping qualities but of medium speeds up to 16 knots. Ships with higher speeds and good sea-keeping qualities were not so easy to build in large numbers, and in any case the 16-knot ship was sufficiently fast in the great majority of cases to deal with the submarine of that time. The true submarine, capable of over 20 knots for prolonged periods and, in escape, independent of weather conditions, presents a very different problem. If the surface ship is to be able to hunt and destroy the submarine it will have to have superiority of speed in open waters. Thus the whole of our reserve of anti-submarine vessels obtainable from commercial sources becomes practically valueless as vehicles on which to mount our anti-submarine attack weapons, however valuable they may be for detection duties. Previously, a U-boat or group of U-boats once detected could be avoided by the convoy and its mobility largely neutralised by keeping it under water until it could be hunted and destroyed. That will not be possible when the new type of submarine comes into being. Unless the enemy can be attacked and destroyed or disabled as soon as it is detected, it will be free to follow, outmanœuvre, and attack any but the fastest of our or any other merchant fleet. Against this, however, must be weighed the difficulties of finding the convoys in the first place. Given comparative immunity from detection by wireless interception, our ocean convoys should have less fear than before of being sighted and reported from the air. Air reconnaissance in open waters must be accurate if it is to be useful, and this presupposes good sea training on the part of the pilots and observers of the reconnaissance aircraft. This quality was not conspicuous in Axis pilots during World War II and it is logical to suppose that the same quality may be even more rare among the air personnel of a country which is far less sea-minded. Further, the art of handling convoys, both tactically and strategically, is far better understood now than it was fifteen years ago, and the evasion of and escape from enemy forces should be considerably more frequent in the future than it was in the past.

The new type of submarine, although it may well revolutionise submarine and anti-submarine warfare of the future, has already lost one of its most important assets—that of surprise. It can no longer be sprung on an enemy unawares. Its special characteristics are known and time is on the side of those engaged in the study of the counter to it. Therein lies a vital difference. In its favour remains the containing factor. The disease will cost far less than the cure.

The new-type submarine should be capable of production at a cost not greatly in excess of that of existing types, but the cost of providing craft of sufficient speed, endurance, and seaworthiness and in sufficient numbers to provide a counter to it may well cause a tremendous if not impossible strain on the finances and shipyard facilities of the countries involved in the protection of vast ship-borne supplies for which an air-lift can provide no satisfactory substitute.

The importance of anti-submarine warfare to countries dependent on sea-borne supplies, as the Allies were in both world wars, can readily be understood by a study of the figures. In World War I Allied shipping losses reached a total of over 5,500 ships of an aggregate gross tonnage of 12,750,000. Of these, U-boats sank 4,837 ships of 11,135,000 tons, or 87·7 per cent. by ships and 88·4 per cent. by tonnage. Of this staggering total 2,097 ships of 6,674,000 tons were British.

In World War II the total sinking of Allied shipping due to enemy action rose to 4,864 ships totalling 21,250,000 gross tons, U-boats being responsible for 2,815 ships of nearly 14,750,000 tons (57·9 per cent. by ships and 68·8 per cent. by tonnage). The drop in percentage was due to increased air attack mainly on the smaller vessels of coastal convoys and to the use of faster and better equipped surface raiders.

Such losses bring a tremendous strain on the economy of maritime nations in war and peace. The figures quoted stress, if indeed stress is needed, the vital necessity of a strong and efficient anti-submarine force. Such a force can only be fully effective if backed up by a submarine branch of such size and modernity that it can both act offensively by attacking enemy submarines or their supply ships and defensively by providing ample training facilities for the surface ships and aircraft of the anti-submarine fleet. Therein lies a shrewd insurance.

"SHELDRAKE"

CHAPTER XIV

CONDITIONS OF SERVICE IN THE NAVY

ONLY NOW, five years after the war, can it be said that the pattern of Britain's peace-time Navy is emerging. The difficult period of transition has been attended by changes in conditions in every branch of the Navy. From the peak strength of 780,000 men in June 1944 the Navy's man-power had shrunk by 1949 to 145,000, and in 1950–51 is to be further reduced to 127,000. In the absence of any emergency, the Navy's man-power is likely to remain at around this figure for some years to come. It is considered adequate for peace-time requirements in the foreseeable future, bearing in mind the strength of the various naval reserves and the need to limit the country's financial burden. The figure will include an annual intake of about 2,000 national service-men. At the beginning of 1950 there were just over 4,600 officers and some 62,000 ratings serving afloat, either with the active fleets, training ships, or units of the Reserve Fleet. The rest were in naval establishments, air stations, or other places ashore.

Provision of sufficient senior trained men to make up balanced ships' companies is at present the Admiralty's chief concern. Owing to "full employment" on shore, a large proportion of petty officers and chief petty officers are disinclined to re-engage for pension on completion of their 12 years' service. This means that the Navy is losing a considerable number of senior ratings just at the time when they become most useful to the Service. It also means that recruiting has to be correspondingly increased in order that the Navy's man-power should remain at the correct figure. It is reassuring that the annual intake of recruits is now regarded as satisfactory, although one or two of the branches are still slightly below strength. The Admiralty is now paying particular attention to the provision of air crews. Between 25 and 30 per cent. of the Navy is now concerned, directly or indirectly, with naval aviation.

As and when the economic situation permits, more schemes are being introduced to maintain recruiting. Where necessary, scales of pay and service conditions are being reviewed and prospects of promotion improved. This applies particularly to the promotion of suitable men from the lower deck to commissioned rank. It is hoped that ultimately some 25 per cent. of the Navy's officers will be provided from the Lower Deck.

HOW TO JOIN

Two types of engagement are open to men wishing to join the Navy as ratings. One is the Special Service engagement, under which a volunteer undertakes to serve 12 years "man's time"—that is, 12 years from the age of 18. He spends 7 years with the Fleet, followed by 5 in the Royal Fleet Reserve. During the latter period he returns to civilian life, but as a Reservist gets a "retainer" of from 1*s*. to 1*s*. 6*d*. a day, according to his rate. He is recalled into the Navy in the event of war or other national emergency. The other is the Continuous Service engagement, entailing service of 12 years with the fleet. Towards the end of the period the man has the option of re-engaging for another 10 years to qualify for a pension.

Men accepting the Special Service engagement, may, if they so wish, transfer to a Continuous Service engagement after 3 years' service over the age of 18, and by re-engaging they also become eligible for a pension after the full 22 years. Both types of engagement are open to volunteers between the ages of 17 and 23. Youths joining at 16 to 17½ have the choice of one of seven branches—Naval Airman, Stoker Mechanic, Electrical, Writer, Stores, Cook and Steward. Boys of 15 to 16 may join as Seaman Boy on a Continuous Service engagement. Should he wish, a boy may change to the shorter Special Service engagement just before he is 18.

ENTRY OF OFFICERS

To widen the field of choice for future officers the Board of Admiralty recently made important changes in conditions of cadet-entry to the Royal Naval College, Dartmouth. In effect, these changes mean that every boy, no matter what his family background or the school from which he comes, now has the chance to go to Dartmouth as a cadet and later become a naval officer. The opportunity is there for the boy of the right sort.

In September 1948 there was introduced to Dartmouth the 16-year-old entry scheme. It is replacing the original 13½-year-old entry, under which a boy went to Dartmouth at about 13½ and stayed for 4 years, during which time he received professional instruction and a first-class public-school education. Then he went on to the training cruiser to finish his time as a cadet. The cost of his education and training while a cadet worked out—so far as his parents were concerned—at about £50 a term. A 16-year-old boy entering Dartmouth under the new scheme spends two years at the College. Then he goes to the training cruiser, after which he is promoted to midshipman.

To call the scheme a "free entry" one, as is sometimes done, is not strictly correct. It is free in that no initial payment is required of any parent whose son is a candidate, and in that a parent whose income is less than £300 a year need not contribute a penny all the time the boy is at Dartmouth or in the training cruiser. The cadet is there with all found—training, board, and accommodation, uniform and clothing, even such expenses as pocket money allowance, are all met by the Admiralty. In this sense it is a "free entry" scheme. Parents whose incomes exceed £300 a year have, however, to make repayments for their son's uniform and personal expenses according to their means. These repayments are on a sliding scale, and range from £1 to £30 a term.

This is not to say that any boy of 16 is now entitled to go to Dartmouth and later become a naval officer. It is not so easy as that! For the few vacancies Dartmouth offers each year (the number of these vacancies is, of course, governed by the Navy's estimated officer-requirements a few years hence) only the very best of the candidates can be accepted. Nothing could be more damaging to the Navy's future efficiency than an influx of junior officers who are not quite good enough. Every boy gets his chance, but only the right boy can take it. The high standard which

Dartmouth has always demanded has not been lowered in any respect. The few who are accepted thoroughly deserve their luck. They must pass a written examination, set by the Admiralty, approximating to the school certificate; they must pass a strict medical test; and, above all, an interview with the Admiralty Selection Board. It is not enough for a candidate to be well educated and physically A.1. He must have the right potential officer-like qualities.

As the 13½-year-old entry ended in the summer of 1949, the last group of these boys will not be away from Dartmouth until Easter 1953. After that Dartmouth cadetships will again be of two types—the 16-year-old and the Special Entry. The first group of sixteens, admitted in September 1948, left Dartmouth for the training cruiser only this summer. Thus it is as yet much too early to discuss progress of the scheme. As is to be expected of so revolutionary an innovation it is coming in for some criticism from those jealous of the Navy's future welfare—just as did the Special Entry scheme when it was introduced in 1913. Years must pass before the scheme can be assessed at its true value. Its success or failure can only be judged when the cadets of today take their rightful place in the Navy and in due course become senior officers.

A few months ago I was privileged to visit the College and see the "new boys" at work and play. I saw them receiving instruction in the gymnasium, in the swimming-bath, in the engineering shops down the hill; and I accompanied a crew of sixteen-year-old cadets in a cutter on the Dart. And, under the watchful eye of a lieutenant, a very presentable crew they were, as they handled the heavy boat in a strong ebb tide. Considering it was their second time in a boat and none of them had yet been to sea, their performance was creditable. The new system, like any other new system, must have time to "shake down." The newcomers have settled in, are doing well at their studies, and are taking their full part in the College activities.

Special Entry cadetships are for older boys from public schools. Candidates who hope to enter the Executive, Engineering, or Supply and Secretariat branches must sit for the Navy, Army, and Air Force examination which is held by the Civil Service Commissioners three times a year, and then pass tests of intelligence, aptitude, character, and personality. Successful candidates enter the College between the ages of 17 years 8 months and 18 years 4 months, and go on to the training cruiser after one term.

Candidates for the Electrical Branch are governed by special conditions of entry. They must have the higher school certificate and reach a certain standard in physics and mathematics, and need not sit for the written examination. Like the other Special Entry cadets, they spend one term at Dartmouth.

Ratings training to be officers under the "Upper Yardmen" scheme go to H.M.S. Hawke, the College near Southampton, which is to be incorporated in Dartmouth. These candidates are discussed later in the chapter.

PAY AND PENSIONS

Standard rates of basic pay apply to all branches of the Navy. For ratings they range from 10*s*. 6*d*. a week for a seaman boy to £4 4*s*. for a chief petty officer. Basic pay is supplemented by emoluments for such items as length of service, good conduct badges, kit upkeep, and marriage allowance. Special payments are also made to certain ratings in skilled trades. Marriage allowances range from £2 2*s.* to £2 12*s.* 6*d.* a week. Examples given in the Admiralty recruiting handbooks might well be quoted here. A 20-year-old unmarried able seaman, with 2 year's man's time, can expect to get £2 6*s.* 8*d.* a week; a 24-year-old leading stoker mechanic, married, with 6 year's man's time and one good conduct badge, £5 9*s.* 1*d*; a chief petty officer, aged 30 and married, with 12 years' man's service and three good conduct badges, £7 14*s.*, of which £2 12*s.* 6*d.* is marriage allowance.

It is true that such pay is low by civilian standards, but it carries with it many substantial advantages. The fact that he has few of the living expenses which must be met in civilian life and that he gets various perquisites, such as duty-free tobacco and clothing at cheap rates, must not be overlooked.

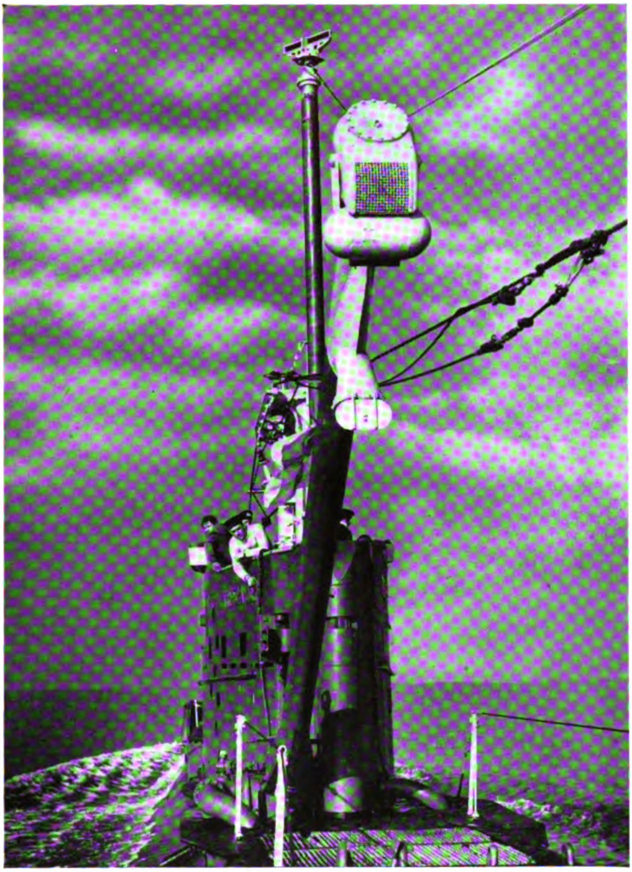
Pensions to men leaving the Navy at the age of 40, after serving the full 22 years, vary according to rate. They range from £1 6*s.* 4*d.* for a man signing out as an able seaman to £1 13*s.* 5*d.* for a chief petty officer. Again, the money is not large, but there is another way of looking at it. How much capital would be needed to buy an annuity bringing in such weekly sums? A long-service able seaman's pension would nowadays represent a capital outlay of about £1,400.

Officers' pay scales range from £136 17*s.* 6*d.* a year for a midshipman to £2,920 for a full Admiral, in addition to marriage allowance. This ranges from 18*s.* 6*d.* for junior officers to £1 6*s.* a day for most senior officers. Very few senior officers achieve the exalted status of Admiral of the Fleet, the highest rank in the Navy. Those who do get £3,285 while in employment, £1,800 when unemployed. An Admiral of the Fleet, by the way, always remains on the active list. He does not retire.

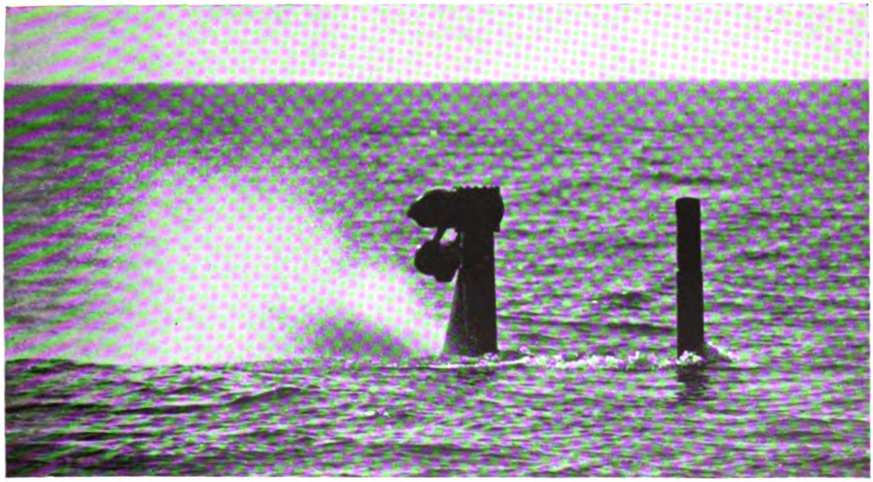
CONDITIONS AND PROSPECTS

A young man entering the Navy as a rating has the choice of joining one of nine branches. These are: Seaman, Electrician, Naval Aviation, Communications, Engineering, Ordnance, Shipwright, Supply and Secretariat, Medical and Dental. In these categories he can specialise in one of 48 jobs. In Naval Aviation, for instance, he can become a naval airman, with the chance to specialise either as an aircraft handler or mechanic, a photographer, a safety equipment rating, or a meteorological observer; or he can become an aircraft artificer. The seaman, who was once a handler of ropes and a jack of all trades on deck, must now be a highly skilled craftsman. His duties have multiplied since 1939. Among other things, he is now responsible for radar plotting and control and for submarine detection. He also can chose and specialise in one of 10 particular jobs. So much for the choice of work given to the newly joined rating.

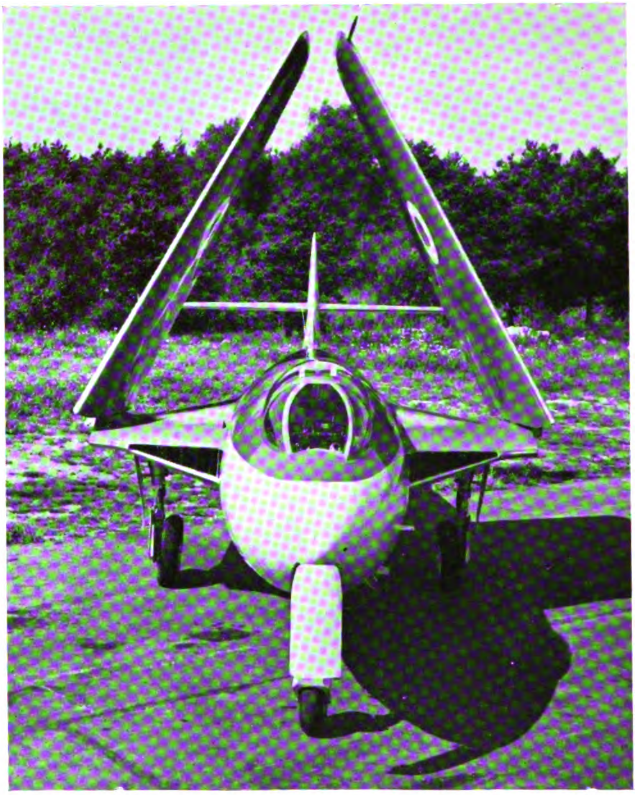
Unfortunately the Navy as a career must always include a succession of family farewells and reunions. In the sailor's life of comings-and-goings that is inevitable. How much of his time can a full-service rating expect to spend afloat and how much ashore? How much time at home and how



H.M.S. Trespasser, showing Snort

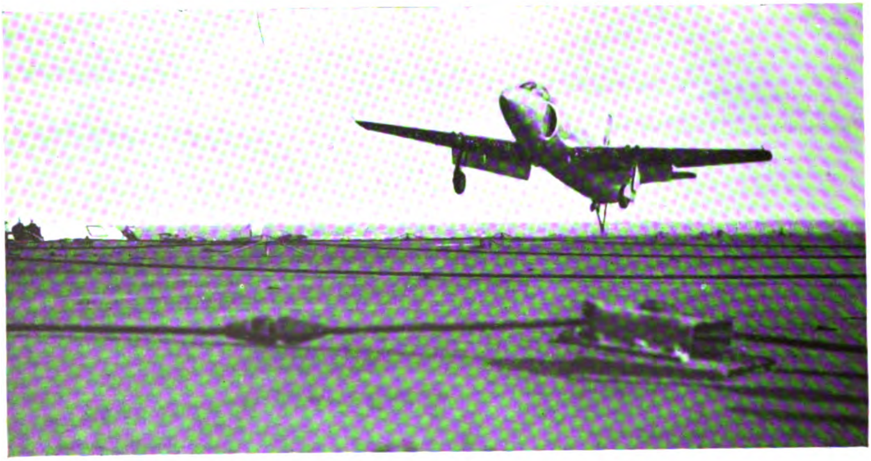


The Snort in action
Central Press photographs



Sea Hawk, wings folded

Courtesy of Hawker Aircraft Ltd.



Vickers-Armstrongs Attacker, landing on carrier

Courtesy of Vickers-Armstrongs

much abroad? These questions are not easy to answer. There are many new factors to be taken into consideration, such as the smallness of the active fleets in comparison with pre-war days, the longer time ships must sometimes stay in harbour, for economy and other reasons. Service on board some training ships which spend most of their life in habour now counts as sea-time. It is possible, however, to strike an average and answer the questions in general terms.

Most men spend more of their time at home—that is, in ships in home waters or in shore establishments—than abroad. On the average, of his 22 years a man can expect to be abroad for about 8¼ years. He spends about 7¾ years in home waters and about 6 years on home shore service. In some cases the periods will be less, in others more. But, generally speaking, these divisions of his time are about accurate. If sent to a foreign station, he can expect to be away for between 2 and 2½ years—again on the average. There are, of course, exceptions, such as writers and men in some categories of Naval Aviation. They will spend less time at sea.

LEAVE

Every rating is entitled to a fortnight's leave before he is drafted to a ship on foreign service, and when he returns he gets 24 days for every year he has been away. Thus after the normal spell overseas he is free to forget the Navy for 50 to 60 days—at the Navy's expense. And while on leave he receives a weekly ration allowance of about £1 3*s*.

Men with the Home Fleet are each entitled to six week's leave a year: a fortnight at Easter, a fortnight in the summer, and a fortnight at Christmas. If his family lives at or near the ship's home port he is lucky. When the ship is in harbour he can usually get permission to take night or week-end leave. Though the Home Fleet makes three cruises a year, in peacetime it spends 5 or 6 months of the 12 in its home ports. Similarly, men in shore establishments are given periods of leave, and leave is also generous on foreign stations. On some of these stations men can, if they wish, spend their time off duty at service leave-camps.

Wives and families are allowed, under certain conditions, free passages to join men serving on foreign stations, but there is a shortage of married quarters. Plans to increase such accommodation are receiving the Admiralty's earnest attention and more of these buildings will be erected as soon as the money is available. In the meantime wives and families taking passage out—and they are going in considerable numbers—have to find their own accommodation. That, as anyone who has served on a foreign station knows, can sometimes be difficult! Parents abroad may send their children free of charge to one of the Service schools which are now established on all but the smallest stations. These schools are run by one or other of the Services and are open to children of members of all three. In those places where no such schools have been established, the fees of a suitable civilian school are refunded by the Admiralty.

AMENITIES AFLOAT

Food in the Navy is good, and facilities for its preparation on board ship have been much improved during the last few years, especially since the introduction of all-electric galleys in the newer ships. Tinned bread, to supplement the normal supply, and food preserved by a quick-freezing method are now being made available for men in submarines on extended experimental cruises. In the past few months tests have been carried out in the Arctic to determine the efficiency of latest equipment, which includes special protective clothing and the best diet for men in this climate. In the same way tests have been made on board submarines and surface ships in tropical waters.

Sports, medical services, food, and clothing—all those items which have to do with the health and welfare of personnel—receive a lot of attention. All the usual field games, beside fencing, boxing, sailing, etc., have their part in the programme of physical recreation. Then there are regattas, always a feature when the Home and Mediterranean Fleets meet. Great is the competition then among ships' companies.

One of the most important contributory factors to the smooth working of a ship's organisation and close understanding between the men in every department is the "Ship's Welfare Committee," which since the war has replaced the old canteen committee. Hitherto a member of the ship's company who wished to make a suggestion or voice a grievance about food or any other item affecting his living conditions in the ship had no option to putting in a request to see his commanding officer and stating his case formally. Now his representative on the Ship's Welfare Committee, a body presided over by the First Lieutenant and containing representatives of all departments, submits the suggestion or states the grievance informally to the committee on the man's behalf. The committee then makes representation to the commanding officer if considered necessary or desirable.

COMMISSIONS FROM THE LOWER DECK

A sound example of the way prospects of promotion have improved since 1945 is the working of the "Upper Yardmen" scheme—which provides opportunities to suitable ratings to gain promotion direct to Sub-Lieutenant. (Promotion to Branch rank and from thence to Lieutenant and above remains, of course, available.) Not so long ago direct promotion to Sub-Lieutenant was so exceptional as to be worthy of comment. Nowadays, when the Navy aims at selecting roughly one of every four of its officers from the Lower Deck, this is no longer so. In all ship's and establishments all ratings who are good potential officers and have the right educational and professional qualifications are keenly sought.

After being recommended by his commanding officer the likely rating appears before a Fleet and Admiralty Selection Board. If successful, he receives special training and then goes to H.M.S. Hawke. There an Upper Yardman who intends to be an Executive Officer spends one year, but candidates from other branches remain for only one term. At the end of their time at H.M.S. Hawke candidates are promoted to Acting Sub-Lieutenant, on exactly the same footing as other officers of the rank who have been through Dartmouth as cadets.

It is indeed a far cry from the Upper Yardmen who gave the scheme its name. In the old days they were the seamen, who, because of their superior skill, manned the upper yards of a sailing ship. No such opportunities were available for them!

EDUCATION

A man's education and professional training continue throughout his naval career. The educational background an officer or a rating requires today is much more comprehensive than ever before. Upon this, his technical knowledge, and his up-to-the-minute professional qualifications depend his promotion in the Service and advancement in any chosen specialist job. The Navy's programme is constantly expanding. Its aim is twofold—to produce the best types of officers and ratings, and at the same time to equip them as intelligent and responsible citizens. Educational courses are constantly given ashore and afloat, the main part of the training programme being carried out in the Navy's many shore establishments.

A boy entering the Service as a Seaman Boy between the ages of 15 and 16 goes to one of two of these places, H.M.S. Ganges or H.M.S. St. Vincent, where he continues his general education to, in some cases, the final standard of a secondary school. At Dartmouth cadets are taken to university entrance standard, and at the Royal Naval Engineering College, H.M.S. Thunderer, at Manadon, near Plymouth—to which every junior engineer officer is sent for lengthy training—entrants attain Honours Degree standard. After preliminary instruction, junior officers of the Electrical branch join Cambridge University for three years and take the full Mechanical Sciences Tripos course.

All acting-sub-lieutenants go to the Royal Naval College at Greenwich, which is recognised as the Navy's "university." There they continue their general education and professional studies. Civilian specialists required by the Admiralty also go to Greenwich.

The full list of training establishments includes schools for specialists in nearly every category of the Navy. For example: H.M.S. Hawke, the "Upper Yardmen" College for those taking commissions from the lower deck; H.M.S. Fisgard, in Cornwall, for artificer apprentices; H.M.S. Raleigh, also in Cornwall, for stoker-mechanics; H.M.S. Collingwood, in Hampshire, for electrical ratings; H.M.S. Gamecock, near Birmingham (naval airmen); and H.M.S. Ceres, in Yorkshire (Writers, Stores, Assistant Cooks, and Stewards).

Although the Instructor Branch which is responsible for the conduct of the Navy's educational programme is not large, its members, all of whom are officers, are men with high qualifications. A number of them are university graduates with first-class or second-class honours degrees in science. Their work ranges from instruction proper to the organisation of reading and study groups, educational contests, and amateur dramatics. Obviously it is easier to conduct such work ashore than in sea-going ships, but in the larger ships particularly educational instruction receives close attention. Every big ship (for instance, the training battleship Vanguard, aircraft carriers, and cruisers) carries two or more Instructor officers. Other units which carry boys, all depot ships, and destroyer flotilla leaders have one each. The duties of the Instructor officer have greatly increased with the changing outlook of the average rating since the war, and with new methods of teaching—the added emphasis on discussion groups and the wider use of news commentaries and educational films.

All seamen boys going to sea at the age of 17 are now expected to reach a standard that will enable them to pass a specified examination a year later. While on board ship they are compelled to attend school for about 4 hours a week during working time. Other classes are arranged in off-duty periods for adult ratings anxious to qualify for a higher rate or commission. Understandably, there are rather more opportunities for such instruction in shore establishments. For instance, in these places at least an hour a week is set aside to instruction in current affairs. And, of course, there are many chances for instruction in, for example, jet propulsion for aircraft, gas turbine propulsion in ships, the technique of radar and in other new fields of scientific development.

PREPARING FOR CIVILIAN EMPLOYMENT

A disadvantage of a naval career is that some men—signalmen or submarine detection ratings, for example—who are about to take their pensions at the age of 40 find that their expert knowledge is unwanted in civil life. To help such men to find work to their liking the Navy has a voluntary scheme which goes by the rather formidable name of Pre-Vocational Training. At present it is available to ratings who have served for 22 years, and in some cases to those about to complete shorter engagements. The Navy operates the scheme by agreement with the Ministry of Labour. Interested ratings may visit naval educational and vocational centres at Portsmouth, Plymouth, Chatham, and elsewhere, and there choose a skilled trade to follow on leaving the Service. At these centres they can receive a month's training in their selected civilian trade. On leaving the Navy they go to one of the Ministry's special centres for the full training period. Instruction at the Navy's E.V.T. centres is at present given in nine skilled trades.

THE ROYAL MARINES

The Royal Marines form a Regiment which has been an integral part of the Royal Navy for nearly three centuries. The motto "Per Mare ad Terram" which appears beneath the famous globe-and-laurel badge indicates its unique duties. The Royal Marines are "sea soldiers," equally at home afloat or ashore. Ever since the Corps was raised in 1664 as the Duke of York and Albany's Maritime Regiment of Foot it has had its own distinctive uniform. It has army ranks and is commanded by a general, but in most other respects it is a naval body.

Of the Marines Lord St. Vincent said: "If ever the hour of real danger should come to England, they will be found the country's sheet anchor." His tribute of a century and a half ago has been fully justified with the passing of time. As guns' crews in the bigger ships of the Fleet the Marines have always been found where the fighting was fiercest. They have served with distinction in every one of the Navy's major sea engagements since the Battle of Cape St. Vincent.

Nowadays the Marines have three main duties: they supply detachments for the bigger ships of the Fleet; they carry out combined operations; and they provide Commando personnel. The two world wars served to add lustre to an already brilliant record. Their heroism at Zeebrugge and the landings on Walcheren Island in 1944, when, in the teeth of the enemy, they opened the way to the port of Antwerp for the

Allied armies, will not soon be forgotten. Despite its multifarious duties the Regiment's peace-time strength is small. In common with the rest of the Navy, its man-power strength is now being reduced. By next year its establishment will be about 10,000 officers and men.

Unlike young men aspiring to a commission in the Royal Navy, candidates seeking officer rank in the Royal Marines do not enter Dartmouth as cadets, but if successful become probationary second lieutenants. But they too must first take the Special Entry examination, and later satisfy an interview board. Joining the Corps between the ages of 17½ and 19, an entrant is promoted to lieutenant on completing 2½ to 3 years' training. After serving 8 years as a lieutenant he becomes a captain. Promotion thereafter depends on merit. Officers' rates of pay are similar to those in the Royal Navy.

Part of the Royal Marine's training is carried out at naval establishments, part at army establishments, as may be expected from his varied duties on sea and land. Like naval sub-lieutenants, Royal Marine subalterns take the comprehensive general education and war course at Greenwich. Other ranks may enlist between the ages of 17 and 23. Boy musicians who hope to earn a place in one of the Royal Marine bands are educated and trained at the Royal Naval School of Music.

NATIONAL SERVICE MEN

The annual intake of national service-men, already much the smallest in the three Services, is now being reduced from a maximum of 10,000 to a nominal 2,000. Most of these men pass their 18-month period in the Royal Navy at shore establishments, in certain ships of the Home and Mediterranean Fleets, and with the Reserve Fleet.

In the earlier part of 1950 the Admiralty introduced a scheme of recruiting calculated to appeal to national service-men who wished to enter the Navy and learn to fly. If, before being called up, a youth signifies his willingness to join the R.N.V.R. for a period of 5 years after his release, he may now spend his entire 18 months training in the Naval Aviation branch. During the last few weeks of that time he serves in an aircraft carrier at sea. He later completes his training as a pilot or observer with one of the R.N.V.R. squadrons which operate from naval air stations. At present commissioned pilots and observers are urgently needed in R.N.V.R. Squadrons to replace some of the men who served during the war. It is hoped that national service-men trained under the new scheme will ultimately form the majority of commissioned pilots and observers in these squadrons.

In June 1950 the Admiralty issued new rules restricting most of the annual entry to men who have already completed a year's training commitment in one of the following reserves—Royal Naval Volunteer Reserve, Royal Naval Reserve Air Squadrons, Royal Naval Volunteer (Wireless) Reserve; and—in the case of Marines—Royal Marine Forces Volunteer Reserve. Some 80 per cent of the 2,000 will in future be drawn from these sources. The men will be expected to rejoin their respective reserves for a further period after their spell in the Service. The remaining 20 per cent will be made up from those whose call-up has been deferred until completion of apprenticeship, and who are needed as artificers; volunteers for air-crew (over whom R.N.V.R. and R.M.F.V.R. men have entry priority); and a few men with special professional qualifications.

At present the Navy is able to meet its peace-time manpower requirements from regular recruiting. It does not really need national service men who serve no more than eighteen months.

THE W.R.N.S.

The Women's Royal Naval Service, which was established towards the end of World War I and became a permament service in 1949, now comprises about 6,000 officers and ratings. Its conditions of service approximate to those of the Royal Navy, but its members do not come under the Naval Discipline Act.

"Wrens" (as they are commonly called) enrol between the ages of 18 and 28, and undertake to serve for 4 years. After that time they have the option of continuing for longer periods up to a maximum of 22 years, when, like their naval colleagues, they become eligible for a pension. W.R.N.S. personnel are allowed to leave on marriage. When family circumstances make it necessary married women may also resign. During the last war a number of Wrens served afloat, but in peace-time, although all ratings are mobile, liable to be sent wherever the Admiralty may require, they serve only in the United Kingdom and on stations in the Mediterranean and Middle East.

The duties of a Wren are many and varied. She can become a writer in an office, a cook or a steward, a sick-berth attendant or a dental surgery assistant, a motor transport driver, a cinema operator, or a telephone switchboard operator. These are only a few of the jobs open to her. She has also opportunities to specialise in one of many important technical categories at naval air stations, such as air mechanic, assisting in the maintenance of aircraft frames of engines; the installation and upkeep of aircraft radio equipment; radar plotting; or the preparation of weather charts.

Nearly all W.R.N.S. officers are promoted from the ranks. Pay rates are from 3*s*. a day for an ordinary Wren on joining to a minimum of 8*s*. 7*d*. a day for a Chief Wren; from a basic £178 a year for Third Officer to £890 a year for a Superintendent. Gratuities of to £140 are paid to Wrens not eligible for a pension. Officers not eligible, but who have completed ten or more years service, receive gratuities ranging from £650 to £1,550.

NOWELL HALL

CHAPTER XV

HISTORICAL BACKGROUND, GENERAL POLICY, AND TASKS OF THE ARMY

HISTORICAL

DESPITE HIS genius as a military organiser and his skill as a field commander, Oliver Cromwell's true claim to fame rests not on these, but on the permanent influence which his methods have had on the minds of the British people. The Lord Protector's rule—suppressing many forms of liberty down to the merest trifles of domestic life—continues to this day to be associated with military power and military men. A people who had previously accepted military service with enthusiasm, and regarded the fighting man as an emblem of chivalry and honour, came, under the Parliamentary major-generals, to regard military service as a form of bondage and high military rank always with suspicion—sometimes with hatred. This attitude, bred during the Civil War, has been intensified, rather than diminished, by the passage of time. Its influence in modern times has been profound.

In the less democratic days of the eighteenth and nineteenth centuries governments were usually able to offer some counter to the popular dislike of military service and the public inclination to neglect defence measures. Even so, it was not found easy to provide Jervis and Nelson with the ships and seamen they required, or Wellington with the stream of reinforcements which the Peninsula campaign demanded. When, on Napoleon's escape from Elba, we were taken by surprise and forced to fight a campaign at short notice Wellington had to take the field with an army largely composed of foreign mercenaries.

With the advance of democracy, and its acceptance by the British people as their ideal and permanent way of life, the difficulties of those responsible for the country's defence have greatly increased. No legislation or executive measures of any kind can be carried out contrary to public opinion. Consequently the German threats prior to 1914 and 1939—although only too apparent to Ministers, their Service advisers, and others holding official appointments—were less apparent to the general public, on whose authority and by whose permission the Ministers held their offices. Because of this our preparations to meet these threats, which culminated in the World Wars I and II, were insufficient. Had they been adequate we might, on both occasions, have been spared the horrors of total war; but even if not it is reasonable to suppose that the duration of the conflicts would have been greatly reduced.

It is a strange phenomena, and one which has surprised our friends and confounded our enemies, that the British race, so reluctant to prepare for war, once it is assured of the necessity or confronted by the actuality fights with a tenacity and determination which almost invariably result in victory. Unfortunately the price is usually a high one—a long war, heavy casualties, and economic difficulties.

The failure of democracies to make proper preparations to defend themselves is not peculiar to the British. It is a defect of the democratic form of government which has not yet been solved.

Today we are again confronted by an aggressor, who has already subjugated those democratic states which were too weak to oppose him. There are, however, signs that at least some of the remaining free democracies have learnt their lesson. Western Union and the Atlantic Pact are signs of the times, as is the fact that the British people have come to accept conscription in time of peace: accepted it as a necessary evil—to be abolished at the first opportunity, but not prematurely.

Before the advent of the air arm, Britain's defence policy was based on an all-powerful Navy. With this shield we could prevent invasion and conduct land warfare overseas at our leisure—or to paraphrase Bacon, we could take as much or as little of the war as we chose. On land we often chose to take very little. It was only when trade interests or security—usually trade interests—were seriously threatened that we took much—as in India, the Spanish peninsula, and South Africa. In those days, however, it was always war on the cheap. There was a lot of bravery in every grade and frequently genius among the commanders: attributes which usually brought success in the end; but there was not much skill or organising ability and the supply of equipment was not lavish—particularly if it was expensive.

Our haphazard, and typically British, type of army continued until the South African War. The initial failures and long duration of this struggle brought home the inadequacy of our army to meet twentieth-century conditions, and when peace came all were agreed that vigorous reform was necessary to put our land forces on a permanently improved footing. The desired results took some time to achieve, but in the years immediately before World War I Mr. Haldane (later Lord Haldane of Cloan), the Secretary of State for War, brought in and developed his great measure of Army reform—a measure for which he never received adequate credit. This great Army reform was indeed a remarkable achievement for a Minister with little previous experience of military affairs and whose whole life had been devoted to matters which were the antithesis of warlike preparations. The main points of the reorganisation were:

(*a*) *A General Staff*, very much on the German model, charged with the organisation and preparation of the Imperial Army for war, and with the co-ordination of the land forces throughout the Empire.

(*b*) *A small Regular Army*, approximately half of which was to be stationed at home and half abroad, the former supplying annual reinforcements for the latter, under a system of two-unit Regiments or linked units. This latter part of the organisation was not new, as it had existed since 1881, when it was introduced by Mr. Cardwell, the War Minister at that time.

(*c*) At home the new Territorial Force (later renamed Territorial Army) took the place of the Volunteers—mainly for the purpose of home defence; but designed with a view to expansion. This force was organised into approximately fourteen divisions; but it was appreciated that it would not reach a sufficiently high standard for active operations until some months after mobilisation.

(*d*) Reinforcements and reserves were catered for by the provision of a period of reserve service for Regular soldiers on completion of their time with the Colours, by Special and Extra Reserve Units, the Supplementary Reserve, and by the Territorial Army Reserve.

(*e*) The senior (at universities) and junior (at schools) Officers' Training Corps were designed to provide a reserve of partially trained material suitable as officers.

(*f*) The Division became the standard field formation, and the forces of the Dominions, India, and other overseas members of the Empire were encouraged to adopt the same organisation and equipment.

(*g*) All the above forces were to be raised on a voluntary basis.

What became known as Mr. Haldane's Army reform, or reorganisation, placed the land forces of the Empire on a footing far superior to anything previously in existence. It provided:

(i) *At home.* A small, highly trained Regular force of one Cavalry Division and six Infantry Divisions available for despatch to the Continent, or any other part of the world, at short notice.

A partially trained and properly organised force for Home Defence, and to provide the framework of an organisation for expansion.

(ii) *Overseas.* A British garrison (to supplement Indian units) for India, Egypt, other possessions and spheres of influence, the Naval bases and ports throughout the world on which our Naval power and seaborne trade depended.

In these arrangements India—with its turbulent North-West Frontier (almost continuously in a state of war) and its permanent internal security problem—had a special place. It was said with truth that in the years between the South African War and World War I the size of the British Regular Army was determined almost entirely by the requirements of India. The fact that under the Cardwell system sufficient units were located at home to provide a small Expeditionary Force was a fortuitous convenience; but was not the main reason for the adoption of the organisation or the system.

From the purely military point of view the Army of 1914 was too small; but considering our naval requirements, political and financial considerations, and our natural dislike of armaments in peace, it is probable that it was as large and as efficient as was possible under a democratic system of government. It cannot be too strongly emphasised that in matters of defence a British Government can rarely do what it would like to do: it can only do what the electorate will allow it to do.

It can be said that in the days of peace up to 1914 this system worked well, and that in the early days of World War I the Expeditionary Force sent to France gave a good account of itself and played an important part in saving Paris and halting the westward march of the German armies.

It was, however, never given a chance in its other role of expansion. This was mostly due to Lord Kitchener's* distrust of the Territorial Army, and the consequent formation of the "New (or Kitchener's) Armies." This departure from the previous intention when the Territorial Force was formed was not entirely successful, due very largely to lack of experience in an undertaking of such magnitude. We raised vast numbers of men, first by voluntary enlistment and later by conscription; but the process of converting these masses into battleworthy fighting formations was learnt largely by trial and error. Before success was achieved we suffered many disappointments and a terrifying casualty list.

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* Lord Kitchener accepted the post of Secretary of State for War on August 4, 1914, and remained in that capacity until his death at sea on June 5, 1916.

With the defeat of Germany and her allies in the autumn of 1918 the task of demobilisation and the restoration of the Army to a peace footing began. If we showed ourselves to be amateurs at making national war, events showed that, in company with all the other nations, we were equally inept at making peace. The world was not to regain its stability before a second world conflict brought confusion even greater than the first.

By the middle of the 1920's the Army had been reduced and reorganised on a peace footing very similar to that of 1913. The Cardwell system operated in most arms, the requirements of India largely governed the size of the Regular Army and the Territorial Army continued in its old form.

Up to 1933, when Hitler assumed power in Germany, the Army was trained for and acted as an Empire police force. When it became clear that the Nazi's were not content to confine their efforts within the Reich, but were looking outside for worlds to conquer, the British Government embarked on a modest but progressive rearmament. This reached its peace-time high-water mark with the introduction of conscription and the doubling of the Territorial Army in May 1939. The latter event certainly recognised the principle of basing expansion on the Territorial Army—the principle which Lord Kitchener had disregarded twenty-five years before. Initially this decision—which was sudden and unexpected—caused much confusion. Existing units were deprived of many of their best officers and N.C.Os. to staff the new units, and in consequence their own efficiency declined. It is, however, doubtful if any better system of expansion could have been devised, and on the whole the new units made good progress and in the latter years of World War II they took the field second to none in fighting qualities.

It is not proposed to digress by discussing matters of strategy or tactics, or by attempting to compare in details the conditions of the two world wars. It will be sufficient to point out:

(*a*) That whereas World War I was notable for the static nature of the campaigns in many theatres of operations, World War II was characterised by fluidity and speed of manœuvre.

(*b*) In World War I the defensive was master of the offensive. In World War II the reverse tendency was in operation.

(*c*) The static nature of operations in World War I made it possible to employ poorly, or partially, trained troops without undue fear of serious consequences. This policy proved fatal in the more fluid campaigns of 1939–45, in which up-to-date equipment and a high standard of training were essential to success. It is not untrue to say that the outstanding characteristic of the British Army in World War I was courage and determination; in the second it was tactical skill and battle-craft.

The theorists who had predicted that the advent of vast fleets of bomber aircraft made armies obsolete were proved wrong, as were those who held that the armoured vehicle had driven the unprotected soldier from the battlefield. Working in conjunction with the new weapons, and supported by modern methods, the infantryman still held pride of place in the land battles of World War II. It was always the foot soldier who finally confirmed and consolidated the victory.

With this background of modern military history it will be found less difficult to judge the task and requirements of the present-day British Army.

THE POST-WAR ARMY'S PROBLEMS

The British Commonwealth of 1950 is of very different structure from that of pre-war days. India with its large British garrison (nearly half the Regular Army) is now split into India and Pakistan without any British troops. Ceylon has undergone a similar change. Burma is a sovereign state outside the Commonwealth.

Hong Kong, our sole remaining possession in China, is menaced by Communist armies on the mainland and is garrisoned by a force almost as large as the British garrison in India in 1939.

In addition the situation in the Middle East and in Africa has altered fundamentally since pre-war days. Ex-Italian colonies in Africa have still to be garrisoned. We are under an obligation to quit Egypt in the near future, and for this and for strategic reasons our East African territories are being developed as military bases.

Our military resources are further extended by the necessity of maintaining considerable occupational forces in Germany, Austria, and Trieste and by our treaty commitments under Western Union and the Atlantic Pact and in support of the United Nations Organisation.

These political changes in the Commonwealth and in our spheres of influence throughout the world have come at a time of grave economic difficulty, which is not merely a temporary depression, like that of the 1930's; it is a condition of national poverty, brought about by six years of total war, and which is likely to persist for many years. These conditions have had far-reaching results in matters of defence. As far as the Army is concerned they have altered the whole structure of our pre-war policy and organisation.

(*a*) The Cardwell system, the basis of organisation for the Regular Army since 1881, is no longer feasible. Apart from staffs and instructional personnel at home, practically the whole Regular Army is serving abroad—in Europe, the Middle East, and Far East.

(*b*) Partly owing to lack of Regular recruits, and partly for political reasons, National Service has become part of our military system. As the period of service is only 18 months, National Servicemen cannot be used conveniently to reinforce the Far East and other distant stations. Thus we have a situation in which Regular units at home and in Europe consist of a high percentage of National Servicemen, and those in Malaya, Hong Kong, and similar distant places of a higher proportion of Regulars.

(*c*) Overshadowing all other problems is the possibility of another world war and the certainty that any European country lacking military power, or strong allies, runs the risk of sharing the fate of the countries of Eastern Europe who now find themselves behind the Iron Curtain. This threat makes it necessary to attempt the maintenance of a balanced army equipped not as a police force, but ready to engage in modern warfare at short notice.

(*d*) This need for a balanced up-to-date army has made it necessary to disband almost half our Regular infantry, by reducing infantry regiments of the line to one Regular battalion each. This shortage of infantry, brought about by the necessity of providing a balanced striking force for Europe, is disadvantageous in the purely occupational role and for guerilla operations such as those in Malaya and in restricted areas like Hong Kong. Thus our military commitments are of two conflicting kinds—the one requiring a modern field force, the other requiring task forces of varying sizes and character, according to the part of the world in which they serve. This is not a new problem for the British Army. We have never been in the happy position of having one, and only one, military problem. We invariably have to organise and train our army for a variety of possible tasks.

THE BRITISH ARMY'S TASK

Before attempting to define the concrete tasks which the British Army of today has to perform, it will be as well to enumerate two conditions which affect the issue—both comparatively modern developments:

(*a*) The fact that the Army of 1950 rarely, if ever, operates except in conjunction with at least one of the other two Services—often with both. Every military operation is now a combined operation.

(*b*) The uncertainty of the influence of atomic weapons on future military operations. This subject has been dealt with in some detail in an earlier chapter. Varying opinions are held, but for the purposes of this chapter it is assumed that atomic weapons, although they may play a great part, will not *by themselves* play a decisive part in future war.

Summarised, the tasks of the Army, *in conjunction with the other fighting services and in some cases the civil air defence organisations*, are as follows:

(*a*) The defence, including the A.A. defence, of Great Britain and Northern Ireland. (It is not inconceivable that under certain conditions the area might be extended to include Eire—in conjunction with the Eire defence forces.)

(*b*) Occupational duties in ex-enemy countries and colonies—Germany, Austria, Trieste, North Africa.

(*c*) The defence of possessions and interests in the Far East—Malaya and Hong Kong.

(*d*) The defence of areas vital to sea and air communications and the protection of supplies of oil and other raw materials—Malta and the Middle East, Bermuda, etc.

(*e*) The provision of forces for the initial defence of Western Europe under the Western Union Treaty and in accordance with our obligations under the Atlantic Pact and in support of the United Nations. This task visualises the possibilities of a major war.

(*f*) Provision for rapid expansion in the event of a major war.

(*g*) By the General Staff, the co-ordination of the land forces throughout the Commonwealth and Empire and advice and assistance to our allies and friends.

These, in general terms, are the tasks which the nation expects of its army, and it will be as well to conclude this chapter by examining the manner and extent to which these duties are being carried out.

(*a*) *The defence of this island* is the most important of all. Should we be the victims of successful invasion or be bombarded from air or land to a paralysing degree, the whole of our defence measures elsewhere—and to a considerable extent those of our allies and friends—would become inoperative. This country is the base for the defence of Western Europe and the workshop, arsenal, and chief recruiting area from which our own forces—and in large measure our allies—are armed, supplied, and reinforced.

This vital task falls on all three fighting Services, the civil defence organisation, and every adult, able-bodied civilian. The special tasks of the Army—repelling sea or airborne invasion and A.A. defence—fall almost entirely on the Territorial Army, which also has the duty of providing the machinery for expansion in a major war (see (*f*) below).

(*b*) *Occupational duties in ex-enemy countries.* A purely occupational role hardly requires an up-to-date balanced army. It is in the nature of a police force required to deal with unarmed or poorly armed opponents. Unfortunately the forces we have in Germany, Austria, and Africa may be required for other purposes, and therefore have to be organised and equipped on modern combat lines and kept in instant readiness (see (*e*) below).

The military occupation of an ex-enemy country is usually an evil necessity. In the case of Germany (and to some extent Austria, Trieste, and North Africa) the occupation carries with it some compensating advantages, in that our forces are in, or near, the possible areas of their employment for another purpose. If our troops now on the Continent of Europe and in North Africa were quartered at home we should, in the event of a major war, have to transport them to localities very similar to those they now occupy. Clearly it is an advantage to have them deployed in advance—provided they are in sufficient strength to give a good account of themselves should the necessity arise.

(*c*) The defence of, and maintenance of law and order in, our Far Eastern possessions—primarily Malaya and Hong Kong—if not the most pressing of our present-day military problems is the one given most prominence in the press, and consequently the one which attracts public attention most. This geographically much reduced sphere of British influence is not only of immense long-term strategic importance, but of immediate importance to our trade and finance. Without the Malayan rubber, and the trading facilities which Hong Kong offers, the future of our trade balance would be even more precarious than it is at present. The "policing" operations which have been taking place in Malaya for some time now are no new problem to the British army. Conditions are similar to those existing in the past in Palestine under the Mandate, parts of India, and elsewhere. Nevertheless, they require a large "man-power force" of a type which does not fit in well with the requirement that all British formations and units should be equipped, organised, and trained for warfare of the most modern kind. On the mainland opposite Hong Kong we are faced with a situation similar to that in Germany—a potentially hostile Communist force on the other side of the frontier. The chances of an "incident" are even more likely than in Germany, as it is probable that the Chinese Communist armies lack the discipline of the Russian troops. The large force which we are compelled to maintain on the other side of the world to protect Hong Kong is a very severe drain on our largely short-term national service army.

(*d*) The provision of garrisons for forts and air bases, such as Gibraltar, Malta, Aden, etc., is a military commitment which we have had to face for generations. It requires little comment. The vital importance of our overseas trade—combined with the dependence of our fleets and air forces, and those of our allies, on good bases and communications—is the measure of their necessity. These small isolated groups are, however, difficult to train on modern lines and it cannot be denied that they considerably reduce the strength and power of any field force which we might put into the field in the opening stages of a major war.

(*e*) The British Government has undertaken definite obligations in connection with the defence of Western Europe and under the Atlantic Pact. In the former we are the senior partner, and the outcome of another major war may well depend on the part we play in the opening stages. With our other commitments—particularly those in the Far East—it is not easy for us to provide the considerable land forces required for this purpose. It is, therefore, imperative that they be of the highest quality in training and equipment, supported by an adequate Air Force and backed by sufficient reserves of men and material. Perhaps the most important factor, apart from technical efficiency, in connection with any British land forces destined to operate in Europe is high mobility and the ability to strike hard and swiftly. We cannot hope to match our likely opponent in numbers, and our deficiency in this respect must be made good, indeed more than made good, by superior skill, mobility, and the quality of our equipment.

(*f*) It is imperative that the Royal Navy and R.A.F. be maintained at a strength and standard of efficiency sufficient to meet all requirements at a moment's notice. In these difficult times of financial stringency the burden of maintaining three fighting services at the pitch of efficiency necessary to provide an absolute insurance is almost insupportable, and is not attempted by any country except the United States of America. Consequently our peace-time army is maintained only at a strength and state of readiness judged sufficient to meet our initial commitments and, in conjunction with the other services of our Allies, take the first shock in a major conflict. For the *ultimate* requirements we rely on completing our training and on expansion, after the declaration of war, and our peace-time plans and organisation cater for this. In World War I our efforts in this direction were laborious and attended by many set-backs and mistakes. In World War II we anticipated events by doubling the establishment of the Territorial Army in May 1939, a few months before the commencement of hostilities. On both occasions we were given the time to build up our armies under the cover provided by the Royal Navy, our existing Army, and (on the second occasion) the R.A.F. It is difficult to judge the time factor in any future war of the first magnitude, but it appears certain that the time available for the effective raising and employment of new forces will be immeasurably shorter than in 1914 or 1939. It is, therefore, of the first importance that the machinery for expansion be brought to the highest pitch of efficiency before hostilities commence. The first reinforcements will be the formations and units of the Territorial Army who, even granted the best facilities and the greatest devotion and enthusiasm, must in many cases complete their training after hostilities begin. Any further expansion found necessary is also likely to be a charge on the Territorial Army.

(*g*) The British Commonwealth can exert its maximum effort in war only if all its forces are properly co-ordinated and employed on a sound plan prepared in advance. As in the past our policy for waging war pre-supposes assistance from powerful allies whose roles must be co-ordinated with our own on a carefully prepared plan. These arrangements are not easy for democratic states where Governments continue or fall at the discretion of popular electorates. It, therefore, falls upon the General Staffs—who enjoy a greater measure of stability than democratic governments—to make these plans.

Conclusion.—As in the past, and as will always be the case with a widely scattered Empire or Commonwealth, our armed forces—the Army in particular—have to contend with two conflicting requirements, namely:

(*a*) The need for dispersion to meet occupational duties, "police" duties and the protection of overseas territories; and

(*b*) the need for concentration to meet a clearly defined major threat in a particular locality.

This makes some degree of compromise essential. The British Army has no alternative but the continuance of its age-old policy of preparing for war under average, rather than particular, conditions; always bearing in mind the really *vital* tasks as opposed to those which are *important* but not actually *vital.* The difference is frequently obscured by the fact that non-vital tasks are often short-term and appear to be of pressing importance, whereas the really vital ones are usually long-term.

The tasks of the British Army, as enumerated earlier in the Chapter, can be classified as follows:

(*a*) *Vital:*
  (1) The defence of Great Britain and Northern Ireland.
  (2) The defence of areas necessary to secure our sea and air communications.
  (3) The provision of a force for the defence of Western Europe under the Western Union Treaty and the Atlantic Pact.

(*b*) *Important, but not vital* (meaning that their non-fulfilment, although it would cause grievous harm, would not result in our immediate ruin and defeat):
  (4) Occupational duties in ex-enemy countries.
  (5) The defence of our Far Eastern possessions.
  (6) Provision for expansion.
  (7) Co-ordination of the land forces throughout the Commonwealth and co-operation with our Allies.

Although this Chapter is devoted mainly to enumerating and discussing the role and tasks of the Army it must ever be borne in mind that modern war, and every phase of it, involves the combined efforts of all three fighting services and not infrequently a direct major contribution by civilian agencies.

C. N. Barclay

CHAPTER XVI

THE IMPERIAL ARMY—COMPOSITION, ORGANISATION AND DISTRIBUTION

SECURITY REQUIREMENTS and the fluctuating trend of world events clearly prohibit a detailed or fully up-to-date statement of the composition, organisation, and distribution of the British Army today. It is, however, possible to make a general survey. Present world instability is reflected in the fighting service even more than in civil life. Although hostilities between the great belligerents of World War II ended in 1945 and we are no longer at war, it can hardly be said that we are at peace. Consequently most of the army's efforts appear to be devoted to dealing with abnormal situations of a short-term nature—guerilla warfare in Malaya, close contact with potentially hostile foreign forces in Germany, Austria, and Hong Kong—and participation in incidents such as the Berlin blockade. These, and similar semi-warlike tasks, make up the life of the bulk of the Army of 1950. Except perhaps at the War Office and at the highest levels elsewhere, there are very few signs of a long-term policy or of the planning which is usually associated with peace. Present conditions make it difficult to give a true picture of the permanent peace-time organisation which the authorities are trying to evolve; but in which they are frustrated by the frequency with which they have to meet short-term requirements.

COMPOSITION OF THE ARMY

I.—PERSONNEL

The Imperial Army consists of:

(*a*) *The Regular Army:*

Male officers and other ranks and women officers and other ranks of the Women's Royal Army Corps and the Queen Alexandra's Royal Nursing Corps—all of whom serve for a period of whole-time colour service and in most cases a period on the reserve. (See note below re national servicemen.)

(*b*) *The Territorial Army:*

Male officers and other ranks and women officers and other ranks of the two women's corps—all of whom serve as "part-time" soldiers, except when embodied (which usually means mobilised), when they serve under the same conditions as Regular officers and other ranks. (See note below re national servicemen.)

(*c*) *Supplementary Reserve:*

This consists of officers of most arms of the service and other ranks of the technical arms whose duties in civilian life are similar to their military duties on mobilisation—e.g. army postal personnel, personnel of army photographic units, etc.

(*d*) *Cadets:*

Youths and boys who voluntarily undergo part-time elementary military training.

Note on National Servicemen.

To understand fully the composition of the Regular and Territorial Armies it is necessary to have a clear picture of the conditions of service of national servicemen—i.e. those young men compulsorily called up for military training. On being called up the national serviceman serves as a full-time soldier for 18 months, by the end of which he is considered to be a fully trained soldier. On completion of his 18 months' Regular service he is posted to a Territorial Unit of the same arm located near his home (or in some cases to the Supplementary Reserve), in which he serves for a further period of 4 years as a part-time soldier. The first batch of national servicemen joined the Territorial Army (on completion of their 18 months' Regular service) in July of this year. Thus both Regular and Territorial units have a proportion of national servicemen, in addition to personnel serving on normal voluntary engagements.

The conditions of service for various grades of army personnel are given in much greater detail in Chapter XX.

The Brigade of Gurkhas.

With the partition of India in 1947 and the creation of the two new Dominions of India and Pakistan, the future of the Gurkha Regiments—which by long-standing agreement had been recruited in the independent state of Nepal—had to be considered.

As a result of discussions between representatives of the British, Indian, and Nepalese Governments it was decided that a proportion of Gurkha Regiments should remain as part of the Army of the Indian Dominion and the remainder become part of the Imperial Army. The Regiments selected for transfer to the Imperial Army were the 2nd, 6th, 7th, and 10th, each of two battalions, making a total of eight battalions. As a preliminary a referendum of all Gurkha personnel of these four regiments was held, at which each man stated whether he wished to serve in an Imperial or an Indian Gurkha unit. When the results became known it necessitated some interchange of personnel.

Gurkhas in Imperial Gurkha units serve for 4 years with re-engagement up to 7, 10, 12, 15 and 18 years, and in special cases up to 22 years. There is no period of reserve service. Gurkha units are officered by British and Gurkha officers. Gurkha officers are of two types:

(*a*) Gurkha commissioned officers (the equivalent of British officers).

(*b*) King's Gurkha officers (the equivalent of Viceroy's commissioned officers of the Indian Army).

It is the intention that of the 8 Gurkha battalions 6 should be stationed in Malaya and 2 in Hong Kong—units being interchangable between the two places by a regular system of reliefs. The ultimate object is to form a Gurkha Division in Malaya of 3 infantry brigades (each of 1 British and 2 Gurkha battalions), and with Gurkha personnel providing signals, engineers, provost, etc., the administrative services being manned by locally enlisted Malays. In Hong Kong it is proposed to have a Gurkha brigade composed of 1 British and 2 Gurkha battalions. Owing to unsettled conditions in the Far East, however, the divisional organisation has been delayed indefinitely, although a beginning has been made by the formation of a Gurkha signal squadron, a Gurkha engineer squadron, and a Gurkha provost company.

The Headquarters system is not unlike that of the Brigade of Guards. The Commander Malaya District is also the Major-General Brigade of Gurkhas, with a staff consisting of a Brigade Major and a Colonel, Brigade of Gurkhas. The latter is the Commandant designate of the Gurkha Recruit Training Centre—not yet formed. At present each Regiment has a Training Wing attached to one of the battalions for training its Gurkha recruits.

The organisation, and terms of enlistment, etc., of the Brigade of Gurkha has been dealt with in some detail—not only because of its actual importance and interest, but because it is felt that the system might well serve as a "pilot model" for the raising of similar voluntary forces from other races in other parts of the world.

II.—THE CORPS AND REGIMENTAL SYSTEM

Although the broad outlines are known to many in this country, the details of our regimental system are extremely complicated and apt to reduce foreigners who try to understand it to a condition of despair. The system has been further complicated in recent years by the praiseworthy attempts which have been made to retain the identity, and traditions, of units whose role and organisation has been changed drastically to meet modern requirements. The conversion of some Yeomanry regiments into Territorial artillery regiments, and cavalry from horse to armour, are examples. In general terms the following is a brief description of the British Army corps and regimental system, although there are many exceptions to the general rule.

A high proportion of army personnel belong to corps—the Royal Regiment of Artillery (which although called a regiment has most of the characteristics of a corps), the Corps of Royal Engineers, the Royal Armoured Corps, the Royal Army Service Corps, and several others. All units of the particular arm of the service—Regular and Territorial—and all non-posted personnel are part of their appropriate corps. They share its customs and traditions, they mostly wear the same uniform and serve under similar conditions. Personnel are interchangeable within units of the corps.

In contrast to the corps system there is the regimental system, which is best exemplified in the infantry. Apart from a few exceptions, infantry Regiments have a territorial connection—the Royal Warwickshire Regiment, the Royal Ulster Rifles, the Welch Regiment, the Royal Scots Fusiliers (Ayrshire), etc.

The depot of the regiment—which may be called the "home" of the regiment—is invariably located in the regimental recruiting area. Until quite recently most infantry regiments consisted of two Regular battalions and one or more Territorial battalions; but post-war reorganisation has resulted in the Regular battalions being reduced in most cases to one. A typical infantry regiment of the line consists of a depot, one Regular battalion and two Territorial battalions. Theoretically officers and men are recruited from the regimental area; but in practice this is far from being the case.

It is not difficult to visualise that a rigid regimental system is unsuitable for conditions of modern warfare—when it is often necessary to transfer men from one unit to make good casualties in another. Similarly some fluidity in the posting of reinforcements is essential. To meet this difficulty a system of grouping regiments has recently been evolved. Under this system like regiments are grouped together for purposes of promotion, reinforcements in war, etc. Groups vary in size, but a typical one is the Lowland Scottish Group of four regiments—the Royal Scots, the Royal Scots Fusiliers, the Kings Own Scottish Borderers and the Cameronians (Scottish Rifles). In course of time it is hoped that a strong group spirit will mature, although up to now units of the various regiments have tended to cling to their regimental identity as far as possible.

In some cases the corps system and regimental system are combined. The old horsed cavalry and yeomanry regiments are the chief example of this. They maintain their old names, customs, and traditions whilst, in their new guise, forming part of the Royal Armoured Corps.

It is emphasised that the corps and regimental systems described above have no connection with training or operational organisation, which is described later.

III.—SUMMARY

Summarised it may be said that the British Army consists of men and women serving on full-time (Regulars and national servicemen) and part-time (mostly Territorials) engagements in corps and regiments.

ORGANIZATION OF THE ARMY

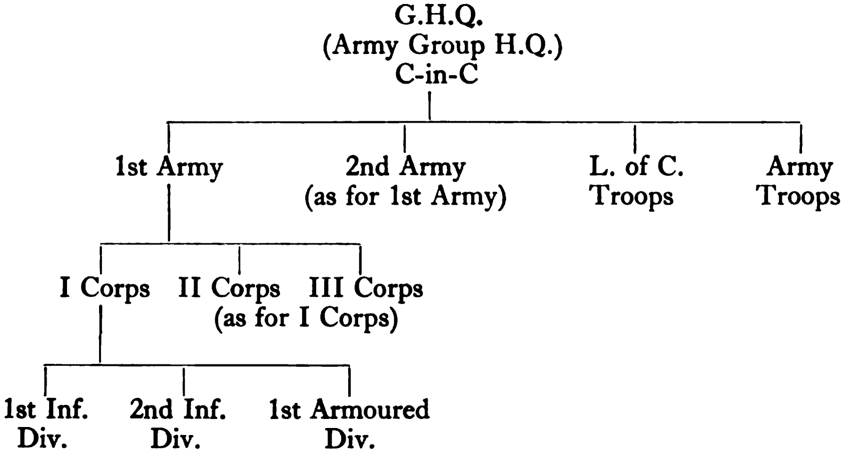
It has been explained how the units of our Army belong to corps and regiments—mainly for purposes of nomenclature and identity, in some cases in connection with Territorial associations; but also to foster the spirit of tradition and regard for ancient customs and usages which, by long experience, have been found to be the surest means of promoting good morale among British fighting men. For purposes of organisation and training in peace, and to meet operational requirement in war, we have a totally different system in no way connected with the corps and regimental systems previously discussed; but which, strangely enough, does not in any way cut across or interfere with it.

The higher organisation of the Army is based on the infantry division and the armoured division—these being the lowest formations comprising all (or most of) the fighting arms, and also the largest formations which we maintain in peace.

A British field force in a theatre of war, unless it be a very small undertaking, will normally consist of a number of infantry divisions and armoured divisions, grouped into Corps, Armies and Army Groups (according to the size of the force) plus lines-of-communication troops and with the addition of Army troops. The latter—consisting of armoured brigades, additional Engineer and Signal units, Army Groups, Royal

Artillery, and the like—will be under the direct control of the Commander-in-chief, but will usually be allotted by him to armies, corps, etc., for particular phases of operations.

The following diagram, based on the 21st Army Group in North-West Europe in 1944–45—but not an exact replica—shows clearly the normal organisation of a British land force of maximum size.



It must be appreciated that the war organisation outlined above can only be fully realised during the latter years of a great conflict—like those of 1914–18 and 1939–44 after the raising and training of a national Army has been achieved. The small size of our Army, combined with its world-wide dispersion, make it quite impossible to maintain any field formation higher than a division in what we are pleased to call *times of peace*.

In the areas of our larger commitments, such as Germany, the Middle East, and Hong Kong, and in the Territorial Army at home, we maintain the divisional organisation, although it often happens that a division is very widely dispersed, each part perhaps performing an entirely different function. In many of our possessions and dependencies—Gibraltar, Malta, Aden, etc., as well as to some extent at home—our forces are organised on the equivalent of a brigade basis, although they rarely conform exactly to a brigade pattern. They are in reality special garrisons to meet the needs of each particular place—not unlike what our American friends call a "task force."

In peace time the headquarters of higher formations are usually organised on a geographical basis—e.g. the Commands at home, Malaya District, etc. They administer and train all troops within their areas both Regular and non-Regular. In a few cases—such as the Middle East Command immediately before World War II—they are organised for conversion into an operational G.H.Q. on mobilisation. It is more usual, however, for the higher operational headquarters required in war to be specially formed as part of the mobilisation plan. This was the case with General Headquarters and the two Corps H.Q.s of the British Expeditionary Force which went to France in 1939, as none of these headquarters existed in peace. This is the main reason which makes it necessary for the Army to maintain in peace a somewhat larger number of higher commanders and trained staff officers than are actually necessary for peace-time requirements—a system, which although essential as a measure of preparation, is not always intelligible to the civilian.

It is apparent from the above remarks that the British Army is organised on a somewhat complicated system, which it is not easy for those who have not studied it or had long experience of its working to understand. It is not based entirely on purely practical requirements; much of it has grown up during centuries of evolution and, like the British Constitution, is founded largely on tradition and custom. Moreover, our world-wide commitments are so varied as to make any rigid or "sealed pattern" system quite impracticable. Unlike Continental countries, who usually have only one military problem, we have many, all of which are not easy to foresee. The British Army has to be prepared for a major war on the Continent of Europe and in the Middle East, to defend its base in the United Kingdom against sea and air-borne attack, for police duties in tropical lands, and for minor duties, such as the London dock strike of 1949.

The organisation which exists to meet these varied practical requirements, and to satisfy the demands of tradition, may be summarised as follows:

- (*a*) A corps and regimental system, which governs the uniform which the officers and men wear, very largely governs their scales of pay, associates them with a long-standing history or tradition and in many cases identifies them with a particular district or locality. This system operates for both Regular and non-regular personnel —men and women.
- (*b*) A system of command in peace which is mostly geographical, but which is combined with an operational organisation in some cases. Examples of this are:
  - (1) The Commands at home are geographical (Northern, Western, Scottish, etc.), but included in these commands are Territorial divisions and independent brigades organised operationally.
  - (2) The Middle East Command is geographical, but contains certain field formations which are maintained on an operational or near-operational basis.
- (*c*) There also exists, as part of our peace-time preparations for war, mobilisation plans for transferring the whole Imperial Army from a peace to a war footing. Obviously the requirements of security make it impossible to give details of this organisation, but in general terms it includes:
  - (1) The calling up of reserves and the placing of all Regular formations and units on a war footing.
  - (2) The provision of headquarters and units which are required in war, but which do not exist in peace.
  - (3) The embodiment of the Territorial Army, and other non-Regular units, and the continuance of their peace-time training to fit them for operational duties.
  - (4) The movement of all existing formations and units to their war stations, or to the theatres of operations in which they are to be employed.

(5) The further expansion of the Army, and provision of additional reserves, to meet the requirements of the war.

THE DISTRIBUTION OF THE BRITISH ARMY

The formations, units and establishments of the Imperial Army fall conveniently into five groups:

(*a*) Those quartered in the United Kingdom.

(*b*) Occupational troops on the continent of Europe—Germany, Austria, and Trieste.

(*c*) The garrisons of the Middle East—Egypt, North Africa, East Africa.

(*d*) The garrisons of the Far East—Malaya and Hong Kong.

(*e*) The garrisons of defended ports and other small isolated detachments. Many of these—such as Malta, Cyprus, etc.—are included in one of the larger commands; but geographically and strategically they are separate and create separate problems.

UNITED KINGDOM

It is the constant endeavour of all British Governments to reduce the numbers and strength of our overseas garrisons to the absolute minimum. This is not only in the interests of economy, but for strategic reasons. The Army Council, like every prudent commander, likes to have the maximum force concentrated in reserve ready to strike in any direction, and the minimum employed upon outpost duties.

From the outset it is apparent that from the point of view of Commonwealth defence the United Kingdom is the one absolutely vital area. It is the main recruiting ground and the chief arsenal and centre of production. An enemy who overwhelms our home base secures his remaining objectives automatically. It is not surprising, therefore, that the main task of the army at home is to safeguard Great Britain and Northern Ireland. The following paragraphs describe in outline the organisation of our land forces at home.

1. *The War Office* has the distinction of not only being a Ministry, but a General Headquarters as well. It is the home of the Army Council, who command the Imperial Army and in varying degrees co-ordinate the entire land forces of the Commonwealth.

In peace there is no separate commander of the Home Army, and the War Office deals direct with the Commands and Independent Districts in the United Kingdom, as well as with Commands abroad.

The Army Council* consists of:

President: The Secretary of State for War.
Vice President: The Parliamentary Under Secretary of State for War and Financial Secretary of the War Office.
Military Members: The Chief of the Imperial General Staff; The Adjutant General; The Quartermaster General; The Vice Chief of the Imperial General Staff; The Deputy Chief of the Imperial General Staff.
Secretary: The Permanent Under Secretary of State for War.

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* See page 14.

In general the Military Staffs at the War Office conform to the normal organisation, namely: General Staff, Adjutant General's Branch and Quartermaster General's Branch. The organisation is further sub-divided into Directorates—Military Intelligence, Training, etc.

2. Commands and Independent Districts. The United Kingdom is divided into:

1 Functional Command: Anti-Aircraft (Stanmore).
5 Geographical Commands: Eastern (Hounslow); Northern (York); Scottish (Edinburgh); Southern (Salsibury); Western (Chester).
1 Independent District: Northern Ireland (Lisburn, Co. Antrim).

(Note: Names of places in brackets indicate location of headquarters.)

As explained earlier, the above deal direct with the War Office, although in both world wars it was considered necessary to appoint a Commander-in-Chief Home Forces with a General Headquarters. The position of Anti-Aircraft Command is exceptional. A-A. formations and units are commanded and trained under H.Q. A.A. Command and administered partly by H.Q. A.A. Command and to some extent by the geographical Commands in which they are located. It should also be noted that *operationally* A.A. Command is under the control of the Air Officer Commander-in-Chief, Royal Air Force Fighter Command.

3. *Lower Organisation.* A.A. Command is sub-divided into five A.A. Groups on a functional and geographical basis. The bulk of the A.A. Formations and units belong to the Territorial Army—the principle being that, as far as is possible, each is responsible for the A.A. defence of its own area.

In Geographical Commands and Independent Districts Formations and units comprise:

Geographical Districts and Areas, containing Regular and Territorial formations and units and establishments such as depots, schools, etc.
Regular Divisions and Armoured Divisions. } The numbers and strength of these alter frequently.
Regular Independent Brigades, Armoured Brigades, and Independent units. } The numbers and strength of these alter frequently.
Territorial Divisions and Armoured Divisions, of which there are a total of 9.
Territorial Independent Brigades (of which there are 7), Beach Brigades (1), and Independent units.

Superimposed on the above are:

(*a*) *The Territorial County Associations*, which exist mainly for the purpose of giving a measure of local control over local units, and are responsible in a large measure for the administration and financial arrangements connected with the Territorial Army.

(*b*) *The Cadet Forces* have been reorganised in recent years and play an important part in preparing many national servicemen for their period of 18 months' training. Before conscription was adopted, Cadets service was a pleasant relaxation, but of very limited value —except to the comparatively few boys and youths who later joined the Regular and Territorial Armies. Today it is in the interests of every young man to make himself an efficient cadet, and thereby lighten his task when he becomes a national serviceman. The increased importance of the Cadet movement in our national life is the excuse for describing its organisation and terms of service in some detail.

The Army Cadet Force, which is for boys and youths between the ages of 14 and 18 years, is organised on a county basis and administered by the Territorial Army Association. Units exist all over the country, and are sometimes—but not always—affiliated to the nearest Territorial Army unit. Welfare is provided by the Army Cadet Force Association. Each county provides week-end and annual camps with Regular army instructors. Pay in camp is at the rate of 1*s*. per day. Numbers vary, but on an average about 50 per cent. attend these camps. All Army cadets are eligible to attend War Office and Command Schools. Cadets are encouraged to pass Certificate A—

Part I (individual); and Part II (leadership), or Certificate T (which is a technical test).

In addition to the A.C.F. there is the *Combined Cadet Force* at schools. In the larger schools this consists of four wings or sections. A basic wing takes all newly joined Cadets. There are also Navy, Army, and Air Force wings which they join later—according to their wishes and particular aptitudes. Many of the smaller schools have less than the full quota of four wings.

A similar organisation exists at universities, known as the *University Training Corps;* but its members are part of the Territorial Army and are not classed as Cadets.

It should be noted that all officers of the Cadet Force are given commissions in the Territorial Army (General List). Army Cadet Force units are divided into "closed" and "open" units. "Closed" means that enlistment is confined to a particular factory, business firm, or school; "open" that any boy or youth who is eligible can join.

Summarised, the objects of Cadet training are as follows:

(*a*) To give mental, moral, and physical training to boys and youths with the aim of instilling patriotism and good citizenship.

(*b*) To give pre-entry training prior to national service.

(*c*) To make a good cadet, and therefore a good soldier—in some cases a good officer.

Enlistment into Cadet Forces is, of course, entirely voluntary.

There is also a *Girls Training Corps* which exists for the same purpose as the Cadet Forces, but on a less ambitious scale. Although recognised, it has no official status. Members frequently help at Cadet camps as clerks, cooks, etc.

INSTRUCTIONAL ESTABLISHMENTS

Any account of the Army at home would be incomplete without mention of the large number of Army schools of instruction which are such a feature of the British Army's system of training. These schools in the United

Kingdom cater not only for officers and other ranks of units quartered at home, but for students from overseas. Although the majority are Regular members of the Imperial Army, many from the Dominion and Allied countries also attend. Perhaps the most important are the Royal Military Academy, Sandhurst (where cadets destined for commissions in the Regular army are trained), the Staff College, Camberley, the School of Artillery at Larkhill on Salisbury Plain, and the School of Infantry at Warminster. In addition to these purely army establishments, there are others common to all or two fighting services, such as the Imperial Defence College (which in addition to officers of the three fighting Services is attended by civil servants) and the Land/Air Warfare School (an Army and R.A.F. establishment). A visit to the Staff College at Camberley or the School of Infantry at Warminister gives an idea of the truly cosmopolitan nature of these instructional establishments. At the Staff College one would meet Imperial Army Officers from all over the world, from every Dominion and our Allies (France, Egypt, Iraq, Burma, etc.). In addition, there are usually one or two representatives from the Royal Navy and R.A.F. The picture is similar at the School of Infantry and other educational establishments.

In addition to the larger Schools controlled by the War Office there are Command Schools—some on a permanent basis; others on a temporary footing to meet particular needs.

OCCUPATIONAL TROOPS IN EUROPE

Under this heading is included the considerable force in Germany—the British Army of the Rhine (B.A.O.R.) and the British contingent in Berlin—and the much smaller forces in Austria and Trieste. It does *not* include military missions, such as that in Greece, or old established garrisons such as Gibraltar. It should be noted that the troops in Germany, Austria, and Trieste are the only British occupational forces in Europe. Those in Italy have been withdrawn. The British forces in Greece—although not occupational forces in the same sense as the others—have now been withdrawn.

With the cessation of hostilities in the early summer of 1945, the British troops in north-west and southern Europe were numbered in hundreds of thousands, if not in millions. Their uniforms were familar in France, Holland, Belgium, Germany, Italy, Austria, and later in Greece, Norway, Denmark, etc. Since then these forces have been progressively reduced until they now comprise the three contingents mentioned above—equipped on the most modern lines and highly efficient, but numbered not in hundreds of thousands, but in tens of thousands.

The duties of the British Troops in Germany and Austria are twofold:

(*a*) To ensure the treaty and armistice terms are carried out, with special reference to the prevention of any form of rearmament or continued war production.

(*b*) To provide the spearhead of the British Army contingent for the defence of Western Europe.

When the size and composition of these forces were first planned (*a*) above was the only role contemplated. Subsequent political events and the sharp division of Europe into Eastern and Western groups made the introduction of (*b*) inevitable and have resulted in it becoming perhaps the more important of the two roles.

The main task of the troops in Trieste is to maintain order and keep the peace between Italians and Yugo-slavs.

In all three countries the British troops work in conjunction with their Allies:

In Germany with the U.S.A., France, and nominally Russia (although unfortunately not with the last in practice).
In Austria with the U.S.A. and Russia (with the latter under the same unhappy conditions as in Germany).
In Trieste with the U.S.A.

The deplorable relations between Russia and the other war-time Allies is partly offset by the cordiality with which the French, American, and British co-operate in all matters at all levels.

For obvious reasons details of the strength, composition, and exact locations of our troops in Europe cannot be given. It can be said, however, that they very roughly represent the Regular forces which would otherwise be quartered in the United Kingdom on the pre-war scale.

THE GARRISONS OF THE MIDDLE EAST

Our widely scattered forces in the area known as the Middle East fulfil two functions:

(1) They act as occupational troops and maintain law and order in the ex-Italian colonies in North Africa.
(2) They are prepared to defend the interests of Britain and her Allies in a part of the world which is vital to them from the points of view of communications, oil, and other raw materials. This role is intimately bound up with our obligations and duties under the Atlantic Pact, and indirectly connected with Western Europe defence. Perhaps their most important duty during the present "cold war" period is to act as a barrier against Communist penetration into Africa—where up to now it has secured only superficial successes.

Apart from its strategic importance the Middle East offers excellent training facilities in most conditions of climate and terrain, with the exception of country of the "hedge and ditch" type which is typical of, and peculiar to, Western Europe. In Europe, particularly in the United Kingdom, it is almost impossible to conduct large-scale exercises in a realistic manner. The deployment for battle of even one infantry division in a thickly populated country results in serious losses and damage to roads, fences, drainage systems, and crops. In the case of a really large force, containing amoured formation, the probable damage is so great as to rule them out altogether. In the United Kingdom and some of the occupied areas of Europe, theoretical exercises without troops, or "skeleton" exercises, have to be substituted for large-scale manœuvres. In the Middle East there are wide areas which are either uninhabited or thinly populated, offering almost limitless possibilities for training exercises on the largest scale and unhindered by restrictions imposed in Europe.

Malta, Cyprus, and other places provide excellent opportunites for combined service training. Moreover, in modern transport conditions the Middle East is close to the United Kingdom, and imposes no limitations on the employment of the comparatively short-service national serviceman.

For many years, indeed several generations, our Middle East forces have been centred on Egypt and the Suez Canal. Many factors have arisen in recent years to alter this strategic conception—new weapons such as improved submarines, long-range weapons, the increased ranges of modern aircraft and the atomic bomb, combined with political considerations, among them the sensitive nationalism of the Egyptians, which resents the presence of a foreign garrison in their country. Headquarters Middle East Land Forces has already left Cairo and been established at Fayid.

For security reasons, and due to the fact that they are constantly changing, it is not permissable, or practical, to give details of troops locations or future plans in this connection. What the final dispositions will be is a matter for conjecture. The process is a slow one, and dependent on long-term building and development programmes. In the meantime we still retain considerable forces in North Africa (in the Canal Zone, by arrangement with the Egyptian Government), the Sudan, and in Malta and other Mediterranean naval and air bases.

THE GARRISONS OF THE FAR EAST

A number of factors have combined in the past few months to direct attention to the affairs of our garrisons in the Far East, which for practical purposes means Malaya (including the Island of Singapore) and Hong Kong (including the leased territory on the mainland). The lifting of the Berlin blockade created a situation favourable to a transfer of public interest; the success of Communist arms in China; our recognition of China's Communist Government; the obvious intensification of Moscow inspired pressure in the East; the long-drawn-out campaign against terrorism in Malaya and the realisation at home of the importance of Malayan rubber as a dollar-earner—these are some of the factors responsible during the past year for increased public interest in the Far East.

At the time of writing the Far Eastern Command is the most active of our overseas commitments and the one which is the greatest drain on our man-power. In Hong Kong it has been officially stated that the Army garrison comprises the 40th division, plus the normal garrison and many technical units—a formidable and well balanced force. Only those who have served in Hong Kong can realise the congestion, and discomfort, which the maintenance of a force of this size in such a small area entails. The climate is not tropical; but in certain months of the year it is far from pleasant, and the precautions necessary in the typhoon season are, to say the least, very irksome.

In Malaya our forces have been engaged for a considerable period in guerilla operations of a type not unfamiliar to the British soldier. It is warfare of a kind in which an irregular enemy, who can transform himself from a fighter to a peaceful civilian at almost a moment's notice, possesses considerable advantages over the regular soldier, whose movements and methods of supply are by comparison cumbersome, and whose intelligence service operates under very difficult conditions. The strength of our army forces in Malaya is not available for publication; but they comprise British, Gurkha, and locally enlisted Malayan units, backed by a considerable Air Force and strong contingents of police, equipped and trained on semi-military lines. The total must be large, but it is safe to say that it is not enough: it never is under such conditions and in close country of that kind.

It must be borne in mind that the circumstances which make it necessary for us to keep such strong forces in the Far East have not been brought about by merely local discontent or put into operation by local mischief-makers. They are part of a carefully prepared plan conceived not in Malaya or China, but in the birthplace and headquarters of Communism, by those who aim at spreading their doctrine throughout Asia, indeed throughout the world. Up to the time of writing there have been no hostile clashes on the frontiers of the leased territories adjoining Hong Kong Island. British and Chinese Communist troops are, however, in close contact and the stage is set for the transformation of the "cold" war into a "hot" one.

In Malaya the "hot" war has been in progress for a long time. The anti-Government guerillas may be partially locally raised; but they are without question backed, reinforced, and supplied by Communist organisations located in adjoining countries—Indo-China, Siam, Burma, and China. The whole trend of events in this part of the world indicates that trouble is only in its infancy. It is part of a plan to engulf all Asia—including India and Pakistan—in the same way as most of the Baltic and Balkan states have been engulfed in Europe.

In face of these conditions only the strongest measures are likely to succeed, and there appears to be little possibility of a reduction in the size of our forces in the Far East in the foreseeable future. It seems more likely that they will have to be increased.

THE GARRISONS OF DEFENDED PORTS

For some hundreds of years it has been a matter of primary importance for Britain to safeguard the ports and naval bases on which depend the efficiency of her mercantile marine and the men-of-war which safeguarded them. In recent years this duty has increased in importance; because most of these ports have, in addition, become air bases or, at least, possess airfields on which most types of aircraft can land and take off. Most of these ports form part of the two Eastern overseas commands dealt with above. The most important are household names—Gibraltar, Malta, Aden, and others. It is sufficient to say that they absorb a large body of Regular troops who in war have to be relieved by less experienced units, mobilised and often reorganised and transported to a theatre of operations —a process which in practice means that they play no active part for at least six months after hostilities commence.

A FEW FIGURES

The following figures are of interest when studying the composition and distribution of Army formations and units:

(*a*) *Strength of Regular, National Servicemen and Territorial Army, Dec.* 31, 1949.

ACTIVE ARMY (MALE)

	Officers	Other ranks	All ranks
Regulars (normal) (men over 17½) ..	16,479	127,602	144,081
Regulars (normal) (men under 17½) ..	—	3,068	3,068
Regulars (short service)	12,629	25,817	38,446
National servicemen	3,466	184,047	187,513
TOTAL	32,574	340,534	373,108

ACTIVE ARMY (FEMALE)

	Q.A.R.A.N.C.*			W.R.A.C.†		
	Officers	Other ranks	All ranks	Officers	Other ranks	All ranks
Regulars	390	—	390	148	1,991	2,139
Short service	507	18	525	532	4,981	5,513
TOTAL ..	897	18	915	680	6,972	7,652

TERRITORIAL ARMY

Male			Female (W.R.A.C.)		
Officers	Other ranks	All ranks	Officers	Other ranks	All ranks
10,102	60,757	70,859	487	9,308	9,796

(*b*) *Total strengths of the British Army on Jan.* 31, 1950.

UNITED KINGDOM

	Officers	Other ranks
Regulars	10,136	65,795
Short service ..	6,096	12,065
National service ..	2,540	117,906
TOTAL	18,772	195,766

ABROAD

	Officers	Other ranks
Regulars	6,675	64,878
Short service ..	5,384	12,440
National service ..	1,809	63,256
TOTAL	13,868	14,0574

THE FUTURE

It cannot be denied that the present world distribution of British troops imposes a serious strain on the Imperial Army. In particular the large numbers deployed in the Far East impose a burden which is both strategically unsound and extremely uneconomical in man-power. Moreover, no improvement in the present position is likely in the near future. Except for the 8 Gurkha battalions, and some locally raised units whose fighting qualities have not yet been fully tested, the responsibility for land defence, and the maintenance of law and order, in the Far East falls almost entirely on personnel recruited in the United Kingdom. The partition of India and the resultant preoccupation of the Indian and Pakistan Armies in their own countries have not helped matters.

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* Queen Alexandra's Royal Army Nursing Corps.
† Women's Royal Army Corps.

In the Middle East the position is somewhat similar. There are a number of very efficient locally raised African units, but British troops provide the backbone of our Army. In this area, however, the problem is less uneconomical in British man-power, as the national serviceman is a more " worth while " proposition. After finishing his basic training at home he can still travel the relatively short distance and perform a useful period of service before returning to be discharged on completion of his 18 months' engagement.

It is clear that there is no immediate solution to the present difficulties; but the present position must not be regarded as permanent. If it is accepted that some revision of existing arrangements is necessary, as a long-term project, it is suggested that it might follow the following lines:

British and Commonwealth responsibilities to be divided into three geographical groups.

(*a*) *Great Britain and the Continent of Europe.*

To remain an Imperial Army commitment.

(*b*) *The Middle East.*

To remain an Imperial Army commitment on a reduced scale. The gradual withdrawal of British troops to be compensated by the raising of a large African Army on the old Indian Army model.

Experience in the recent war indicates that the African—commanded, staffed, and led in the field by sufficient numbers of British officers—will make a brave and skillful soldier in modern conditions.

(*c*) *The Far East.*

This area to cease eventually to be an Imperial Army commitment—except perhaps for a very few units. Responsibility for defence and law and order to be taken over by the Dominions of Australia, Ceylon, India, New Zealand and Pakistan supplemented, as at present, by Gurkha and locally raised units.

It is appreciated that many factors make the *early* completion of this part of the proposal impracticable. It is, however, an ideal at which we might aim, and to which a beginning might be made in the near future—followed by a gradual process towards fulfilment.

Army reorganisation of the kind indicated above would not effect the Army only: it would of course have to be on a three-Services basis.

C. N. Barclay

CHAPTER XVII

ARMY TRAINING

It is on record that a distinguished Oxford Don who was also an enthusiastic Territorial, in a year not so long before the late war attended the annual training of his unit at a camp located next to an Army School of Instruction. Part of the training required him to attend a number of lectures in the school. At the conclusion he was talking with the Commandant and in summary what he said was this: "I have never in my life met such a high standard of lecturing and instruction." That was high praise indeed, and if not true of the Army as a whole, it defined the standard set up by that particular school. At that time little was done by direct instruction in the art of teaching; mostly officers and N.C.Os. learnt "on the job" by hard work and by following the example and pretext of others.

A great change has been wrought in the Army by the large increase in the number of men passing yearly through it, and consequent increase in the number of men to be trained annually. At the same time, as Mr. Strachey emphasised in presenting the Army estimates, there is a decline in the number of Regulars, the junior officers and N.C.Os. on whom falls the day-to-day burden of instruction. These two factors form the main training problem facing the Army today: how to provide enough good instructors. The old methods are no longer sufficient.

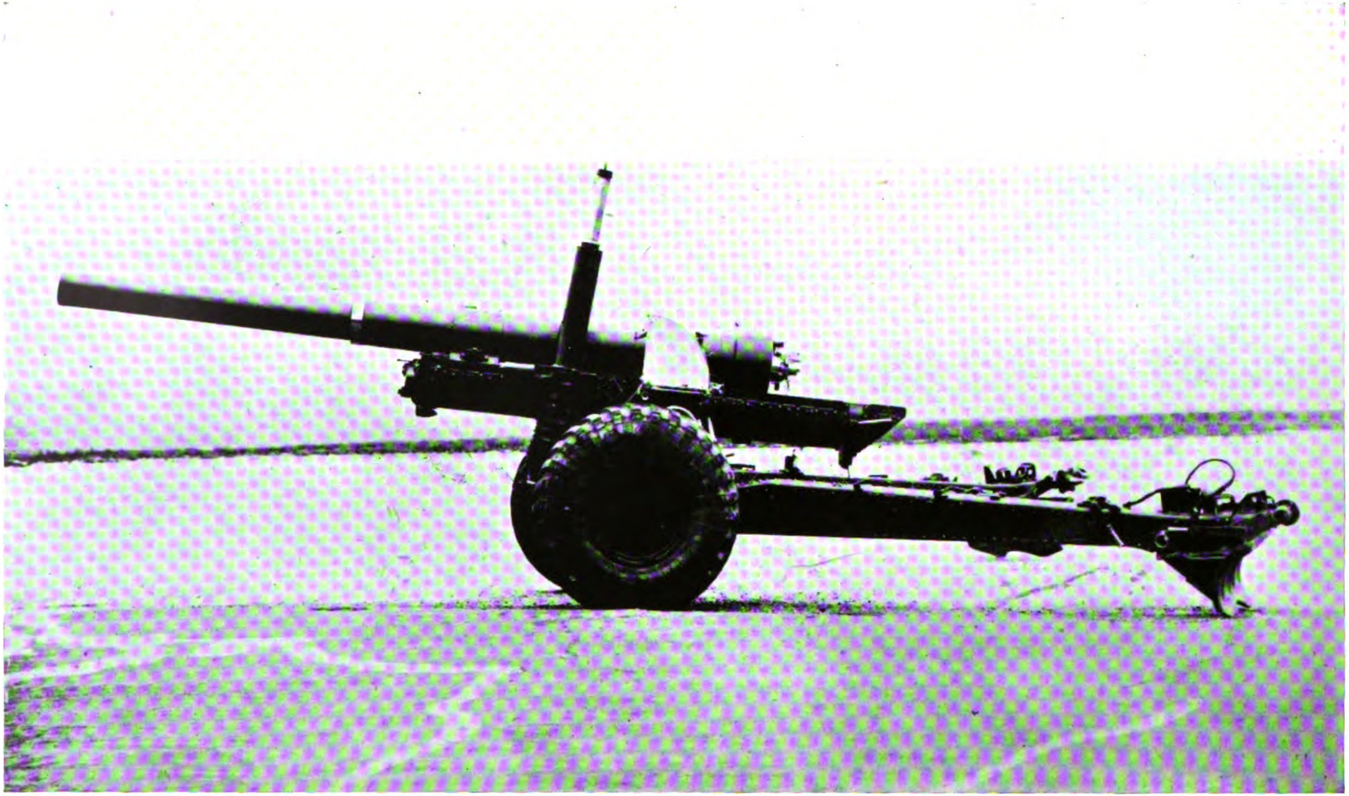
It is not appropriate to describe in detail the scale of effort which goes into solving this problem; certain examples, however, will indicate the lines along which it is tackled and how the Army seeks to put into effect the two basic principles of progressive and interesting training. To begin with, there are the officers of the Department of the Scientific Adviser to the Army Council, who are constantly being called upon to undertake basic researches. Mainly these are in the field of relating effect to original cause. The type of problem which might be given to this body would be to invite them to make a survey of road accidents with a view to seeing if training was at fault and what changes could be made to training methods to improve the accident rate.

The knowledge and long experience of persons expert in their own subject is utilised, as is shown by a review of the method of teaching rifle shooting which has recently been held and as an outcome of which it is hoped that the same subject will now be taught in a more interesting manner, in a shorter time, and with better results.

The syllabus in the recruit-training organisation is under a process of constant review by the staff to see that it is balanced, economical, progressive, and producing the result units need. The staff structure is designed to see that overlapping as between Schools of Instruction is cut out, and that a common doctrine is taught. Great care is taken to achieve common doctrine throughout the Service. This is done through the medium of manuals, pamphlets, courses of instruction, and high-level staff studies.

British parachutist about to jump

By courtesy of the War Office



British 5·5 inch Gun–Howitzer. The Army's standard medium artillery weapon

By courtesy of the War Office

Steady progression in training throughout a man's service is one of the more difficult principles to make effective. An interesting experiment in this direction is being made by one of the technical corps. Training in matters considered technical to a corps is normally regarded as the concern of the corps and not of the General Staff and the formation commander, who are responsible for the purely military training. In this case, where the weekly time available for military training is very limited and commanding officers are fully occupied by the technical training and functional tasks of their units, a complete and detailed syllabus of military training has been worked out by the War Office covering the whole year. Some of the advantages of this system are that continuity between the recruit training unit and the active unit are assured, and the individual on moving from one unit to another loses the minimum of ground, the syllabus being common to all units of the corps.

The principle that a high all-round standard of instruction is essential to effective training is recognised in the courses held by the "Methods of Instruction" organisation and by the pamphlets and instructional documents which it produces. "Methods of instruction" is the Army equivalent of the Navy's "instructional technique." Increasing emphasis is being placed on the necessity for care and time in the preparation of instruction, and it is coming to be recognised that in these days, when so much reliance has to be placed on the young inexperienced junior officers and N.C.Os. one of the main training functions of their superiors is to supervise and assist this preparation. Saving of time and effort by the use of mechanical and visual aids and devices to training is well understood and is typified by the use made of films and strips, but this is considered to be a field capable of development and certain reorganisations designed to achieve a more co-ordinative effort are in hand.

THE NATIONAL SERVICE ACT

The National Service Act (1948), which was passed by the House of Commons on July 30, 1948, to become effective on January 1, 1949, made provision for all men called up to the Army to do one year's full time service followed by six years' part-time service. This was amended on December 16, 1948, to provide for 18 months' full-time service followed by four years' part-time service. The passing of this Act produced no physical alteration in units of the Recruit Training Organisation, since, as it but took the place of war-time Acts which were still in force, the size of the fortnightly intake and the age of entry remained unaltered. The principle changes brought about were to place a statutory limit on the full-time service; and to fix a definite period of part time, or reserve, service with a statutory liability for annual training.

RECRUIT TRAINING

The war-time recruit training organisation was in two echelons: the Primary Training Centres (P.T.C.), responsible for selection and general military training common to all arms up to certain standards; the Corps Training Units, responsible for technical and special to arm training of the individual up to defined standards. Such a system is not entirely suitable to present needs, in that full advantage not being taken of the training capacity of active units, it is expensive in man-power, and it produces a less economic ratio of recruit to active-unit training time. The two echelons of units had therefore by the beginning of 1949 been amalgamated into one and the result called an "Arms Basic Training Unit," which, whilst affecting economies in man-power and time, retained the main characteristics of the war system. These Arms Basic Training Units (A.B.T.Us.) with the Army Basic Trade Centres (A.B.T.Cs.) make up the basic training organisation.

The war-time system of selection had been split into two parts: selection to arm is now done before entry into the service; selection within the arm, to determine the trade or employment for which the individual is best suited to be trained, is done in the Basic Training Unit. A common minimum standard of general military training, covering such subjects as weapon training, discipline, drill, health and physical training, is given to every man entering the service. Special to arm training, in degrees varying according to corps and the actual employment for which the individual is being trained, is also given in Basic Training and Trade Training Units.

Regular recruits are passed through a selection system on the same lines as that for National Servicemen and do their recruit training with them in the same units and with a few exceptions for the same periods of time.

During the year under review certain increases were made in the length of recruit training for men going to the Far East, and, as announced by the Secretary of State in the House of Commons, no man may now go to that theatre until he has completed 16 weeks' training and has 18 weeks' service. This change is clearly paying a dividend, for it is noticeable that commanders at all levels have spoken highly of the enthusiasm and effectiveness of young soldiers serving in that theatre.

THE TRAINING OF THE NATIONAL SERVICEMAN

The amendment to the Act increasing the length of full-time service from one year to eighteen months brought about a change in the conception of the function of the national serviceman, who is now looked upon as an ultra-short-service Regular. With only eighteen months available there is no time to be lost, and the principle of progression becomes more than ever important. The more the individual feels that he is a useful member of his unit and doing a worthwhile job, the more interest he takes in his task and in the service, and the more likely is he to make it his career. The increase of six months in full-time service, from which stemmed the change in outlook towards the national serviceman, brought about in the first place a clarification of object. For whilst the intention to train the national serviceman to the limit of his military capacity was unaltered, it was clear that at the same time he should be trained to be of maximum usefulness to his active army unit. In the second place, with a few exceptions, the national serviceman now completes a full year in the active army after passing through the basic training organisation, and is thus assured of covering one complete training cycle, which includes as its culmination the most essential elements of unit field training and higher training in co-operation with all arms of the service. Under the original terms of only one year's full-time service this could not have been achieved, and many men would have missed the unit and higher training phases, with loss in progression and interest. A further advantage was that it now became possible to post national servicemen to units as far afield as Malaya and Hong Kong, where they obtain not only good training but excellent experience.

HIGHER TRAINING

The importance of collective training of all arms together above unit level was well demonstrated in the Rhine Army Manœuvres, which took place in Germany early in October 1949 and were the first manœuvres on any scale to be held in that country since the end of the war. Up till then concentration of military effort had been devoted to the occupation role, and though this had demanded the highest skill, resource, and initiative in junior leaders, which in themselves are good training, large-scale collective training of all arms had tended to go by default. The real object of these manœuvres, known as exercise "Agility II," was to enable the C.-in-C. to see for himself, and to bring home to the troops, how well or otherwise they had been trained as individual soldiers, or, put another way, to find out when exercised collectively to what extent the men and their junior leaders were capable of applying on a large scale and as part of a big picture the detailed knowledge and skills to which their individual and unit training had been devoted. "Agility II" was a two-sided army-air exercise in which Belgian, French, and United States units participated with the 2nd Division and other British units. The Secretary of State for War was present with a party of six members of Parliament. The exercises achieved the object and provided convincing evidence that the individual training of the Regular Army is being carried out on sound and practical lines. It showed that the young soldiers, Regular and national service, had acquired an ability to handle mechanical weapons, wireless sets, tanks, and guns, and to construct defences, which was a credit both to themselves and to the officers and N.C.Os. who trained them.

In the Middle East the widely scattered locations of units together with other commitments prevented the concentration of a division for training, but a number of all-arms exercises below that level were held. In the Far East intensive training has been carried out by the Hong Kong Garrison. Anti-Aircraft Command have participated in extensive exercises with the R.A.F. Bomber and Fighter Commands.

For the first time since the war, as announced in the Press, field training by a brigade group of all arms was carried out in the United Kingdom in the late autumn. The keenness of the young soldiers was a noticeable feature of these exercises, which were only marred by the fatal crash of a participating R.A.F. 'Meteor' fighter, the pilot in his enthusiasm to attack a ground target apparently coming in a fraction too low.

STAFF STUDIES AND INDOOR EXERCISES

In all theatres a number of indoor exercises and studies have been carried out with the objects of training higher staffs and of studying specific problems. A series of these exercises were conducted at home in conjunction with the civil authorities as a result of exercise "Britannia," which was held late in May at the Staff College, Camberley, under the direction of the C.I.G.S.

The object of this exercise, was, as announced to the press, to study the organisation of Civil Defence with special reference to the part that might have to be played by the Army. It was attended by all senior Army officers at home and abroad, by senior officers of the other two fighting services, and by senior officials of the Home Office, Ministry of Health, General Post Office, and all other Government Departments concerned. The Home Secretary attended on one day, as did the Prime Minister and Minister of Defence. Problems studied included provision of troops, the nature of the tasks which they might have to perform, training and equipment required, command liaison and relationship between the troops and Civil Defence forces engaged in joint operations, and the possibilities and limitations of the help which the Army might be expected to give in the administrative field. The part which the Army can play in Civil Defence, without detriment to its primary role of building up and training formations for active service overseas, is limited, especially in the early stages of a war. Consequently the bulk of the burden of civil defence will have to be met by the Civil Defence organisation and the Government have decided that the role of the Army is to be prepared to find mobile columns, roughly of brigade group strength, ready to go to the help of the Civil if required. These columns have been styled the third echelon of the Civil Defence organisation, though "final reserve" would be a more descriptive title. The third echelon would not be called in unless the first and second wholly Civil echelons were unable to compete with their task in the time required or were showing serious danger of becoming exhausted. It was considered that well-trained and disciplined troops would require little special training to fit them for their third echelon role. Emphasis was placed on the necessity for careful study and joint planning to solve the wide variations in local problems, on the relative siting of headquarters, and on the establishment of reliable communications.

OFFICER PRODUCTION

The Royal Military Academy, Woolwich, and the Royal Military College, Sandhurst, were revived after the war as one establishment located at Sandhurst and named the Royal Military Academy, with the task of training candidates for Regular commissions in all arms. The pre-war syllabus, which has been extensively modified to provide a more general and less military education, remains at its old length of 18 months. Officers are commissioned on leaving the Academy and either sent direct to units or passed through a further brief course where they learn the technique peculiar to their corps. In the case, however, of certain technical arms a number of officers go on to the Military College of Science at Shrivenham to take a Degree Course in Engineering or Science. This course, which lasts two years and is to be increased to three, is notable in that it is the first time a university degree can be obtained as the result of studies conducted at a military institution.

There are two Officer Cadet schools to train the national service officer. Candidates for commissions are chosen whilst serving in their Basic Training Units, from where, after ten weeks' service, they go to one of these two schools to complete a sixteen-week course before commissioning.

N.C.O. TRAINING UNITS

During the year the two remaining Leader Training Units, whose task was to train potential N.C.Os. were closed down on the grounds that the time had come for this function again to be undertaken by parent units.

SCHOOLS OF INSTRUCTION

No major change has been made in Army Schools though some reductions have been achieved both in function and in the size. This has been done principally by eliminating certain courses and Schools, the primary purpose of which was to make good the training arrears of the war. War Office Schools are of three broad types: Inter-Service; Army Schools, dealing with subjects common to the whole Army; and Arms Schools, special to one arm or corps. Military schools are designed to carry out one or more of three broad functions: to train Army or unit instructors; to train individuals for certain more specialised tasks, such as staff officers; to train certain types of technician who can be more economically trained centrally. In dealing with the second category the assistance of civil institutions is on occasion sought. Military schools are a major instrument for the evolution of policy and technique, and for assuring the maintenance throughout the Service of a common doctrine.

THE TERRITORIAL ARMY

The Territorial Army will receive its first entries of national servicemen from the Colours in the summer of 1950, and from then on will be assured, for the first time in its history, of a steady inflow of *trained* soldiers. The emphasis here is placed on the word *trained*, for it is realised that in only 18 months it is not possible to produce all the fully trained specialists and tradesmen that a modern Army requires. The mere fact, however, that the Territorial Army is about to receive trained soldiers gives it a far firmer base upon which to build than it has ever previously enjoyed.

The national serviceman's obligation for part-time service is sixty days' training. In the Territorial Army this will be done at three annual camps and the rest at evening drills and week-ends. Organisational problems have arisen out of the relative positions of men's homes and neighbouring units. Men cannot go long distances for their out-of-camp training. It has therefore been accepted that about one fifth of the national servicemen cannot be posted to units of the same arms in the Territorial Army as those in which they did their full-time service. The decision to reopen the Supplementary Reserve and to post national servicemen to it for their part-time service will help to mitigate the extent of rebadging, since this Reserve is nation-wide and does no out-of-camp training. The obligation for sixty days' training is the same, but will normally be done in four fifteen-day training periods under Active Army supervision.

In 1949 there was a very high level of attendance by the Territorial Army at camps, which were run essentially on a unit basis. The main aim was to train officers and N.C.Os. of units to become trainers to the national servicemen when they begin to flow in for their part-time service. In 1950 camps for field force units will be run on the basis of brigade groups of all arms. A start was made during the year on putting into force the policy of establishing Command and District Study Centres. The purpose of these Centres is to provide a place where indoor exercises at varying levels can take place, both for Regulars and Territorials, and where short courses for officers and N.C.Os. can be held. A beginning has also been made in establishing Weekend Training Centres. These are a post-war innovation the full value of which will not become apparent until units begin to fill up during the next three years with national servicemen doing their part-time service. The pre-war conception that the training of a Territorial Army soldier at his individual task or skill was carried out in his drill hall and on a nearby training area—often referred to as "backgarden areas"—has undergone a change, especially in the Royal Armoured Corps, Royal Artillery of the Field Army, Infantry, and Royal Engineers. Such areas may be too small for present-day needs, so the system of the Weekend Training Centre has been evolved, the purpose of which is to provide a place where the individuals can be welded together into the basic fighting teams of their arms, and where they can carry out elementary tactical training on the general level of the platoon within the company or the troop within the squadron. This system is of particular application to industrialised counties, where "backgarden" training areas may not exist and where units are relatively close together. It has the added advantage of affecting economy in the amount of equipment held by units, and so reducing their administrative overheads. In Anti-Aircraft Command there is a similar system of training on a gun-site basis.

CADET FORCES

The principles of cadet training have not been changed though the organisation has been recast. Broadly, the School O.T.Cs. have become Combined Cadet Force (C.C.F.) units and the Army Cadet Force (A.C.F.), created during the war, has been continued. The C.C.F. continues to give basic military training to all cadets with the object of producing leaders, but now includes Naval and Air Force sections in certain contingents. The A.C.F. differs from the C.C.F. in that units are not related to any school, are not inter-service, and have an extensive citzenship-training function. Battalions of A.C.F., whose sub-units are often widely dispersed, are controlled by County Cadet Committees and normally are affiliated to the local T.A. unit. The normal practice is for each C.C.F. and A.C.F. contingent to do one camp per year of about a fortnight's duration in addition to their day-to-day training.

NEW METHODS AND DEVELOPMENTS IN TRAINING

No new or revolutionary methods of training have been introduced during the year, but great emphasis has been placed on the attainment of a high standard of individual training and skill, especially with weapons. The Director General of Military Training in a broadcast on the Third Programme during the autumn expressed this view when he likened the art of training and commanding troops to a sandwich. He said that at the bottom, the first layer, is the morale factor which implied the physical and moral courage and determination of the troops to fight. On the top there was the generalship, which included the planning and whole conception of the battle, the ultimate object of which was to ensure that the troops were put into action in good array with the right equipment and in such circumstances that they stood every reasonable chance of defeating their opponent. Finally, in the centre of the sandwich, there was the meat, an essential ingredient. The meat is the individual skill and ability of the soldier to perform the task which was assigned to him. However good the generalship, however high the morale, inefficiency by the individual in the particular skill which it was his task to perform in battle would result in discomfiture, if not in actual defeat. In summary, the General showed that the speed of modern machines, the development of the air factor, the increased range and power of modern guns, rockets, and other lethal weapons, and the development of wireless communications, had but emphasised the importance of individual skill and professional efficiency.

The organisation developed during the war for giving training in the methods of instruction has come under review with the aim of putting it on a more permanent basis, and of placing more emphasis on the development and coordination of all types of training aids and devices. A closer link up with the Education Corps and the Scientific Adviser's department will also be achieved.

Promotion examinations are to be reintroduced for officers for promotion from Captain to Major. They are to be held annually, the first being in October 1950. The examinations will be on pre-war lines, including written papers on defined subjects and a practical test in tactics. Officers with certain qualifications will again be exempt from the whole or a part of the examinations.

Educational training policy has been to some extent modified to meet the needs of the changing composition of the Army, and a relationship has been re-established between educational standard and non-commissioned and warrant ranks. The broad purpose of education in the Army is to provide everything educationally necessary to improve the individual both as a soldier and as a citizen and to meet his needs as an individual. To this end education is classified under the two headings of "General" and "Individual." General education, which is compulsory up to standards defined by examinations and with certain conditions of exemption, is not only closely related to the soldier's military training and environment, but is intended as a definite adjunct and aid to it. It is the responsibility of commanding officers in the same way as is military training, and is conducted both by Royal Army Education Corps Instructors and by Regimental officers and other ranks. Individual education, as its name implies, is not compulsory and has as its object the provision of facilities to serving men as nearly as possible similar to those which would be available to them in civil life. Its organisation is entrusted to the Education Corps. As a part of general education, but as a preliminary to it, a new syllabus has been introduced for use during the basic training period. This is of a very general nature and is particularly designed to give commanding officers the maximum help in adapting recruits to military life, discipline and training. To meet the diverse needs of particular arms or units, considerable latitude is permitted in the selection of subjects from the syllabus. This is an improvement which has been universally welcomed. Special provision is made for the basic education of national servicemen and Regular recruits who on entry into the Service are of an abnormally low educational standard. Backward men are sent on a six-week course at a Primary Education Centre run by the Royal Army Education Corps.

Physical training underwent considerable change during the war. The new methods and techniques then introduced have been further developed so as to link it, like education, very closely with purely military training, to which it is both an adjunct and an asset. "Purposeful" is the keyword of modern Army physical training. The gymnasium exercises are related to movements required of the soldier in his military capacity, such as lifting stores and ammunition, handling a rifle, scaling obstacles, pushing a ditched vehicle or manhandling a gun. The last of the special remedial physical training units developed during the war to recondition the physically backward, the sick, and the wounded, was closed down in 1949. The technique and its application is now restricted to convalescent depots and to hospitals.

Physical training has two main objects, each governed by the medical fitness of the individual. The first is broadly related to the period of recruit training, the second to the active-unit phase. The first aim is to develop the recruit to the highest individual physical efficiency so that he will not only be able to undergo other forms of military training without strain, but will also acquire the skill and endurance necessary for the subsequent performance of his particular role in an active unit. The second aim is to maintain the trained soldier's physical fitness and further develop his skill and proficiency in the directions required by his particular role and arm of the service.

Harmonious development of the whole body being as essential a factor as steady progression, each period of training, or table as it is called, follows the same sequence of exercises: mobility or warming up to avoid damage to stiff and cold muscles; strength; endurance; agility, dexterity, and speed; poise and bearing. Explanation and films are used to bring out the ultimate object of the exercises, and in this way the essential purposefulness of physical training is constantly emphasised.

No satisfactory answer has been found to that aspect of the officer's training usually referred to as "off-parade training." In former times much that assisted in the building up of character, self-reliance, powers of leadership, and a quick and ready eye for ground was done off parade through the medium of field sports, long-range hunting expeditions, mountaineering, and travelling. The rising cost of living, changed financial circumstances, and other conditions of the times have tended to remove the sources of such training out of the reach of practically the whole body of officers. Various proposals to remedy the position have had to be dropped on account of the cost and the urgent necessity of spending the funds on more essential requirements. However, flourishing saddle clubs have been established in some corps, notably in the Royal Artillery, to encourage and assist riding. As an aid to these the Ministry of Agriculture have made concessions which will ease the difficult forage situation. Sailing is becoming increasingly a soldier's pastime, and regimental crews have been not without distinction in the field of ocean racing, where pride of place has for the time passed from the Sappers to the Gunners. Perhaps, though, in the coming years the Sappers will produce another *Ilex*.

Closely allied to "off-parade training" is motor cycling. Motor cycle trials, which embrace other ranks as much as officers, have the further advantages of directly assisting military training and of providing a testing ground for W.D. machines with the object of improving their design. They were first introduced in 1938. Since the war their scope has been considerably extended. There is an Army motor cycling association which lays down rules and instructions for military trials and the conditions of entry of approved civilian competitors. The association is assisted by Command and District Committees who organise trials. In addition, the Royal Artillery, Royal Signals, and Royal Army Service Corps conduct their own trials. War-Department-owned machines and petrol are used in military trials, but their use is not permitted in civilian trials, though there is no objection to individuals taking part whilst on leave and using their own machines.

USE OF LAND FOR TRAINING

A major development in post-war training technique has been the decision to continue the war-time practice of using live ammunition in tactical exercises and especially in exercises involving the co-operation of all arms. This decision was made known in the White Paper on the "Needs of the Armed Forces for Land and other Training Purposes," presented to Parliament in December 1948 by the Prime Minister (Cmd. 7278).

The permanent requirements of land by the Army for training purposes were considered by the Government in 1947 and a policy was defined in the White Paper, under which the Army is allowed a maximum of 648,000 acres. The general procedure for examining the Service's proposals for permanent acquirement, or for the renting of training rights, was also defined, and whilst it has the objections of being long and slow it does insure that all aspects of the proposals are fully examined and all objections thoroughly ventilated. In this connection it has to be recorded that at the Public Enquiry on Trawsfynydd in North Wales certain witnesses sought and obtained permission to speak in Welsh. On occasion they were apt to lapse into English, only to be prompted to start again in their chosen tongue. During the year under review considerable progress has been made towards obtaining the Army's permanent needs and in releasing requisitioned areas no longer required as well as in clearing unexploded missiles from areas scheduled for release. This latter is a formidable task involving in some areas yard-by-yard scrutiny of the ground, and is unlikely to be completed before the spring of 1951. By careful reconsideration, planning, and compromise with such conflicting interests as agriculture, forestry, amenities, water boards, and ornithological societies, it has been possible to reduce the Army's total requirement for training areas to the neighbourhood of 550,000 acres. This total includes five areas of considerable extent called Practical Training Areas (required for the purpose of all-arm tactical training using live ammunition previously mentioned), as well as artillery and R.A.C. practice ranges.

A considerable part of this total acreage is not owned by the Army, but is land over which it rents the right to train. This latter category broadly covers areas used infrequently and at irregular intervals and areas where the damage done to the ground can be discounted. Interference with agriculture is, therefore, small and interference with amenities is restricted to the minimum. The extent to which War Department land is used for agricultural purposes is well illustrated by the artillery range at Sennybridge, where sheep grazing rights are leased at a very small amount per head on the scale of one sheep per acre. The range runs to about 30,000 acres and the rights are fully subscribed.

The greatest training-area problem confronting the Army is provided by the Royal Armoured Corps. The weapons in use at the end of the war had reached a stage of development in which it was becoming practically impossible to find inland ranges on which tanks could fire their main armament without compelling the closure of roads, evacuation of farms and houses, and interference with amenities. Such conditions are an unavoidable necessity in war, but are not acceptable in peace. Consequently ranges for the Royal Armoured Corps are tending to be located on the coast firing out to sea. It is unfortunate, but understandable, that the type of firm, well-drained terrain required for tank training is good agricultural ground. Poor agricultural ground, such as Dartmoor or the Scottish Highlands, is too soft and boggy. A further difficulty is the size of modern tanks. In pre-war days it was possible to hold autumn manœuvres in non-military areas by invoking the Manœuvre Act for damage to agriculture and roads was small; but with the modern armoured fighting vehicle, too broad to negotiate a gate, damage would be liable to be more extensive.

COMMONWEALTH AND ALLIED LIAISON

The British Army maintains liaison with three broad classes of country: the Commonwealth and Empire; Western Union and Atlantic Pact; others to whom there are treaty obligations. The means of effecting it are by locating liaison staffs in London and in the Commonwealth; the machinery of Western Union and the Joint Services Mission in Washington; through military missions; by visits; and by the attendance of students on courses at schools and at demonstrations. It would be tedious to catalogue amplifying details, but the following facts indicate the extent of this liaison.

In the year under review 710 Commonwealth and foreign students attended courses at military schools in the United Kingdom, whilst 72 British Army officers attended courses overseas. Fourteen V.I.Ps. and senior officers visited training establishments in the United Kingdom. Mention has already been made of the participation of foreign units in British Army manœuvres in Germany. British units had previously participated in their exercises. A British anti-aircraft unit paid an extended visit to Holland and Belgium. Finally, a plan has been brought into operation for an exchange of visits of about three weeks' duration between officers and other ranks of the British and French Armies.

"ITER"

CHAPTER XVIII

ARMY EQUIPMENT

"THE EQUIPMENT of an army includes all articles, material and munitions of war which are necessary to put that army in motion, and to preserve its vitality and facility of manœuvring when in motion." The first published Army Equipment Manual* gave the above definition of "Equipment" and it is one which has well stood the test of time. It is contained in one of 8 volumes, each of 300 pages, which list the entire catalogue of military equipment then in use. It is interesting to compare it with its modern counterpart, *The Vocabulary of Army Ordnance Stores*, a massive work which runs into scores of volumes and close on half-a-million pages. It also lists the prices of each piece of equipment, but the difference between these and some of the early prices is not so great as one might expect.

There are no satisfactory records of the cost of military equipment before the reign of the Saxon Edward, but by the Treaty of 1173 between Henry II and the Earl of Toulouse, the latter was to pay an annual levy of one hundred marks of silver or ten war horses each worth ten marks. Even allowing for the effects of devaluation, this represents a present-day price of £100 sterling. Again, in 1207, part of the royal ransom for King John was "ten horses each worth thirty marks"—i.e. a sterling equivalent of some £300.

The invention of gunpowder and its adoption by the military forces of the world—though at first only for heavy artillery—did much to simplify the military equipment of the day, for after it had been in use for two centuries and had been adapted for use by the single soldier, the traditional cuirass, shield, helmet, and protective armour became of comparatively little value and were discarded. Length of swords and lances ceased to be an advantage, and the individual equipment of the soldier began remotely to resemble its present-day equivalent.

INDIVIDUAL EQUIPMENT

In 1864 the Commander-in-Chief appointed a committee to "Consider how far the large amount of heart disease prevailing among soldiers of less than two years' service is attributable to the present system of drills and accoutrements, and of reporting as to . . . the pattern of accoutrements and knapsacks best adapted to obviate the evils complained of." † The Committee duly sat and, it must be recorded, reported unfavourably on the existing pattern of equipment; and, indeed, although they examined twelve suggested variations, they were unable to approve any of them. This is not really surprising, since the soldier in those days was expected to carry bedding and equipment to a total weight of 60 lb. 5¼ oz., in addition to the clothes he normally wore. As a matter of fact, this problem is still engaging the close attention of military specialists, and although it would perhaps be untrue to say the problem remains far from solved, nevertheless there are still many aspects of the question for which there is, as yet, no entirely satisfactory answer. Not only does modern load-carrying equipment have to obviate heart disease in young soldiers, but it is so designed as to allow the soldier to function as a soldier and not merely as a beast of burden.

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* *Handbook of Equipment*, 1865.

† *Report on Army Equipment*, 1876.

True, the weight distribution should be such that the soldier can use the lower portion of the chest and the upper part of the belly for breathing. The weight should be taken on the back, where it helps to keep the spine extended, thus demanding less muscular effort to support it. At the same time the soldier when in the prone position should not present too large a silhouette. There are problems, too, regarding freedom of muscular action, accumulation of perspiration, the durability and flexibility of the equipment and its behaviour in the tropics and in extreme cold.

Fortunately, the British Army has ample experience of operating in a tropical climate and the behaviour of equipments under these conditions is well known. Steps are being taken to guard against climatic defects such as the tendency of stitching to deteriorate under jungle warfare conditions. However, since no man can forecast where the next war—if and when it comes—will be fought, action is also being taken to examine the behaviour of British Army clothing and equipment under arctic conditions. In this field the Army works in close collaboration with the Polar Institute and other scientific bodies. The problem is not only one of devising equipment which will function under conditions of extreme cold. Even more important is research into means of maintaining the fighting efficiency of the individual at temperatures far lower than those to which he is accustomed. The design of clothing suitable for arctic use is therefore receiving attention.

Military clothing generally has progressed a great deal since the days of scarlet coats and pipe-clayed helmets, and the recently announced combat suit is an important step along the road towards the ideal equipment. Chief among the defects of the ubiquitous battledress is the fact that it provides no protection against rain. It is, in fact, water absorbent. The greatcoat is heavy and cumbersome and the groundsheet when worn as a rainproof restricts freedom of movement of the arms, gives little protection to the lower body and none at all to the legs.

The "combat suit," which is still in the experimental stage, is designed to overcome all these defects; it is made of windproof and water-repellent gaberdine, allows considerable freedom of movement and can be worn in a variety of ways to suit a variety of climatic conditions. In extremely hot weather the soldier of the future may be able to wear the trousers of his combat suit with an open-neck shirt, adding, as the weather gets colder, the jacket of the combat suit or even wearing it on top of a suit of battledress The new short greatcoat, too, can be worn under the suit if necessary, or as a conventional greatcoat. For wear with the new "combat suit" a revolutionary form of headgear has been introduced. It too is made of water-repellent gabardine and is designed to protect the head from wet and cold and the eyes from glare, and has a flap capable of being turned down over the ears. When not in use it can be folded up and carried in the haversack or pack.

Also forming part of the suggested future active-service dress of the

Army is the poncho. Originally of South American creation, where it proved of great value to the open-air workers of the pampas, it is designed for wear over other clothing and equipment when protection from heavy rain is required. It can also be used as a groundsheet and is provided with press studs to facilitate its use as a bivouac shelter. It is a very simple piece of clothing consisting of a rectangular waterproof sheet, with a hole in the centre for the head, and with sleeves. Its unmilitary title caused it to come in for some good-natured humour when first it was presented to the civil population and *The Times* of the day carried a jocular leader headed "Ponchos for Pongos!", but the writer, for one, would have been profoundly grateful for its protection during some of the wetter campaigns of the war.

MECHANICAL EQUIPMENT

So far we have examined those items which spring most readily to mind when one talks about a soldier's "equipment," but as our eighty-five-year-old definition has shown, the word covers a multitude of things. Certainly from the financial point of view the term has a much wider application. In 1949 the Minister of Defence told Parliament: "The bulk of the funds available to the Army will be used to meet ordinary maintenance requirements and reserve deficiencies and for the overhaul or modernisation of existing equipment. Nearly £14½ million will be spent on the vehicle overhaul programme alone. Among the more important items in the Army re-equipment programme are tanks, radar and radio; in the field of air defence provision is made for the modernisation of certain types of specialist equipment and the replenishment of reserves." * In order of priority, the policy with regard to re-equipping the Army is as follows:

(1) Re-equipping of Anti-Aircraft Command.
(2) Provision of tanks and armoured cars.
(3) Providing a new range of post-war "B" vehicles, i.e. wheeled vehicles other than armoured cars and scout cars.

A.A. ARMAMENT

With the advent of atomic warfare it is of the utmost importance that our anti-aircraft defences shall have a high degree of effectiveness. This can be achieved in many ways, but two of the more obvious ones are:

(*a*) complete automaticity, and
(*b*) increasing the velocity of the projectile.

There is a story of a pilot on the Missouri who invariably appeared to be day-dreaming when steering his craft through the rocky and hazardous waters of his native river. When an irascible skipper challenged him with this, he received the imperturbable reply: "Of course. If I can get my mind off my work I do it automatically—and therefore all the more perfectly!", which, if it was not very good English, at least recognised the need for the elimination of the human error. This same point is also realised by the Army's equipment planners, especially in relation to anti-aircraft equipment. The aim is complete automaticity from radar to guns, but exactly how far we have gone along the road to achieving this is one of the things our potential enemies would give much to know. It is, however, safe to say that compared with performances in the past, we may expect a great increase in efficiency from future guns.

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* Statement on Defence, 1949, par. 50. See *Brassey*, 1949, page 184.

Describing the problem of muzzle velocity, the wartime Commander of Anti-Aircraft Command said: "We were trying all the time to increase the efficiency of our equipment and one of our ideas was to find methods of increasing the muzzle-velocity of our guns and reduce the time of flight of the shell. This was one of the great inherent difficulties of anti-aircraft gunnery. You could get the most efficient form of predictor, you might achieve accuracy with your radar, and then when you fired the gun the enemy would see the flash, jink, and as the time of flight of the shell was hardly ever less than ten seconds, he could be well away from the predicted spot before the shell got there." * During the war great strides were made in increasing muzzle velocity both by modifying the gun and the ammunition, but the objective is to produce equipment which is a definite stride ahead in development rather than a modification of an existing type.

However, in many cases, as progress renders equipment out of date, it is possible to bring it into line with more modern issues by processes of modification and conversion. This is a procedure which is going on all the time and by means of which a great saving in finance and manpower can be achieved, at the same time ensuring that Great Britain's defences are kept abreast with the latest developments of the Research Departments.

Although fourteen years have gone by since Sir Henry Tizard announced that "aircraft had already been reported sixty miles out to sea by new methods of detection," the science of radar is still, comparatively speaking, in its infancy. In the Army its chief use is the detection and location of enemy aircraft—a job which it does remarkably well. But as newer and better forms of prediction and location are introduced, the problem of equipping the R.E.M.E. with suitable tools, testing devices, and spares, becomes acute. Over a million pounds is being spent on this background alone.

To sum it, it can be safely said that Anti-Aircraft Command is being re-equipped on a sound and balanced plan and that considerable results will be seen if and when it is called upon to play its part in the defence of this country.

FIGHTING VEHICLES

The next priority in the re-equipping of the British Army is the provision of tanks and armoured cars. During the war many hard words were said about our armoured fighting vehicles; some were justified, some not. Certainly between the years 1928 and 1932 Britain was ahead of the world in tank design, and if, as some authorities maintain, that lead was lost during the war, every effort is being made to re-achieve it now.

The closing stages of the war saw the introduction of the German Royal Tiger tank—a formidable successor to the Tiger, mounting a 128-mm. gun. However, owing to its colossal weight and reputed mechanical unreliability, the tactical handling of this giant was such that the vehicle was not so much a tank as an assault gun. There is much to be said in favour of a super-heavy tank and the idea is one which has appealed to

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* *Ack-Ack*, by General Sir Frederick Pile.

many specialists from time to time. During the war Lord Beaverbrook—then in charge of aircraft production—said, "I don't care a damn whether it's going into an aeroplane or not. . . . I want an outsize tank with a huge gun in it." However, there are a large number of drawbacks to the construction of a mammoth tank.

Field-Marshal Montgomery made it clear that he was in favour of a universal tank, i.e. one that could act as a heavy assault weapon, but which would also be suitable for the more fluid requirements of the pursuit and enveloping actions. On the other hand, there are equally eminent authorities who place their faith in speed, reliability, and manœuvrability, Somewhere between the two lies the happy medium, and our present aim is to balance all the requirements and mount the best possible gun behind the optimum thickness of armour, bearing in mind the limitations imposed by the size and horsepower of the engine. But in order that our tank commanders should not again find themselves in the invidious position of being unable to penetrate the enemy's armour, the question of a suitably powerful gun in a heavily armoured tank is engaging the closest attention of those people who deserve that much-abused title "experts." Meanwhile, a comparatively big overhaul programme is being initiated for our existing self-propelled guns, and here at least our stocks are sufficiently large to meet all our likely requirements for some time to come. They include the well-known Valentine 17-pdr. and the M.10, both of which did good service during the war, but with modifications both to the gun and ammunition which should lead to a considerable increase in performance.

Although originally designed during the war, the Centurion tank has only been in production for the last two years and units and formations are being progressively equipped with it. As far as is known this is the only new tank to be produced in any quantity since the end of the war. It is powered by a Meteor petrol engine developing 635 brake horse-power, and the gearbox and steering, combined in one unit, is of the familiar Merritt-Brown type. The 50-ton Centurion is the standard tank of the Royal Armoured Corps and the one in which they will go to war if it comes within, say, the next ten years. The lighter Comet tank, with its super-accurate 77-mm. gun, is also still in service and will continue to remain in service for some time to come.

TRANSPORT VEHICLES

The third priority, i.e. the provision of a new range of post-war "B" vehicles, is being worked on in close collaboration with the United States of America, as indeed are all our production projects. Since the end of the war practically no new military vehicles have been purchased. Firm designs and specifications have however been worked out for the Army's post-war range of "B" vehicles, but until these come into full production an interim policy is being pursued. This policy is designed to meet the Army's immediate requirements in four ways: by rebuilding a considerable number of vehicles of wartime design; by purchasing a small number of specialist types of civilian pattern vehicles, which cannot be impressed in the event of war; by using up wartime stocks—mostly of North American origin; and by a limited production of vehicles of the post-war range.

One of the lessons learned early in the war was that for most military purposes stock civilian vehicles do not come up to the required standard. In a modern army it is essential to have vehicles designed from the start for Army use. For example, the ideal Army vehicle should have high cross-country mobility; it should be capable of operating in either arctic or tropical temperatures without major modification; it should be capable of being delivered by sea (and in some cases by air); and it should, of course, be able to carry and tow special military loads.

These requirements are being met in six main types of vehicle, namely:

The jeep.
1-ton truck.
3-ton lorry.
10-ton lorry.
Light tank transporter and tractor.
Heavy tank transporter and tractor.

It goes without saying that there will be variations within some of these types, e.g. the 3-ton lorry will not only appear as a load carrier, but also as a workshop, a stores truck, and so on, but basically they will all be the same lorry. A less expensive range of vehicles is being considered for units whose functions do not normally carry them forward of Corps H.Q. These will have relaxed specifications and virtually no cross-country performance.

Throughout the planning of these vehicles the aim has been to reduce the number of types to a minimum and to use as many common components as possible. These vehicles will be far better than anything the Army has known in the past and the rigorous tests through which the prototypes are passing will ensure that a high standard of efficiency and reliability will be achieved. It is planned that production will commence in 1951–52 with the British jeep and 10-ton lorry, but until then—and probably for some time afterwards—a small number of vehicles will have to be purchased on the civilian market.

OTHER EQUIPMENT

Considerable progress has of late been made in the field of military engineering, and future types of bridges, mines, etc., will continue to maintain their high standard. The ubiquitous Bailey bridges, widened and strengthened to carry the heavier loads of more modern equipment, will almost certainly be conspicuous on the battlefields. Although they will be capable of carrying the many new equipments at present only in the prototype stage, they will continue to maintain their basic principle of construction—i.e. each component part will be manageable by manpower alone without artificial lifting tackle. Consideration is, however, being given to a new form of military bridge which will be erected by mechanical means.

It is a brave man who would forecast the lines on which the next war will be fought, and amateur military critics are fond of saying that Britain always prepares for the last war. Certainly in the last war mines played an important part on both sides, and although there are conflicting schools of thought on the value of this type of equipment, the study of mines and minelaying is not being neglected. The ideal mine should be virtually undetectable and "unprodable"; in other words, it should have no metal content and be of such a shape that prodding the ground with a bayonet or steel spike will not disclose its location.

Much is being done in improving the basic weapon of the infantryman—the rifle. The advantages of the self-loading rifle as opposed to the bolt-operated single-shot weapon are self-evident. Although no move is being made in the immediate future to replace the existing type of rifle, the possibilities of various semi-automatic self-loading types are being carefully examined. This, if considered practicable, would considerably increase the fire power of the infantry platoon, but the introduction of such a weapon would, of course, intensify the problem of ammunition supply. There is, however, one important infantry weapon which can and is being improved, and that is the one-man anti-tank weapon.

Here many possibilities present themselves. In the last war the Piat* did sterling work, but in many respects it was not thought to be as good as the German Panzerfaust or American bazooka. Lessons have been learned from all three weapons and steps are being taken to ensure that in future the infantryman will be armed with an effective means of dealing with enemy tanks and armoured cars. Here we have been working in close liaison with the United States of America and Canada, and the object in each case has been to agree some form of standardisation between the three countries.

This alone is an enormous problem, which is being closely studied on both sides of the Atlantic. Agreement has now been reached between Canada, Great Britain, and the United States of America on many aspects of standardisation of equipment, and it is hoped that great benefits will result from this policy both to ourselves and ultimately to other members of the North Atlantic Treaty. The effects of standardisation, when they make themselves felt, will be far-reaching, since the changing of the basic equipment of the various armies will be involved. Standardisation will, of course, be introduced gradually and will be confined to new equipments at present in the prototype stage. For this reason the authorities are naturally reluctant to release details regarding the progress of standardisation and exactly which items in the half-million pages of the *Vocabulary of Army Ordnance Stores* will be standardised and which will retain the individuality of their own country.

The aim of standardisation is to ensure that in time of war there is the minimum difficulty in co-operation between Allies, and to enable them to make the maximum possible use of combined research and effort. The ideal would be, in war, if the driver of a British lorry in action had a wheel rendered useless by shellfire, he could salve a wheel from the ruins of, say, a French lorry and would find that it fitted his vehicle perfectly. It is manifestly clear that the prime benefits will result from a standardisation of ammunition calibres, and this perhaps is the one aspect of the problem which is receiving the closest scrutiny at the moment.

THE PROCESS OF EQUIPMENT

The task of equipping a modern army involves more than just the provision of the right tools for the right job at the right time. Arrangements must also be made for the housing and issue of the equipment. An interesting sidelight on this is provided by the speech of the War Secretary introducing the Army Estimates for 1949. He said: "This equipment (i.e. wartime stocks) was often stored in conditions which were satisfactory when the turnover was rapid, but useless if the goods had to be housed for several years. The storage and maintenance problems were increased as equipment was handed in on demobilisation and the depot staffs became smaller and smaller. Much of the storage in this country and overseas was in requisitioned buildings urgently needed for civil purposes. . . . Some goods have been sold, others have been disposed of to Commonwealth Governments or friendly foreign Powers. Stocks have also been drawn upon to help Greece in her struggle against aggression."

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* "Projector, infantry, anti-tank."

Now that, as we have shown, the wartime stocks are running down, the stores accommodation situation is not so acute and well equipped ordnance depots have taken the place of the wartime improvised dumps. Nor is the question of disposal of surplus equipment so urgent, for the same reason. Nowadays the only surplus equipment is that which is obsolescent or obsolete and disposal of this is handled by the Ministry of Supply. Many pounds worth of American as well as British equipment has been disposed of by this Ministry, though large quantities of equipment of U.S.A. origin remain in use. For example, the American 155-mm. medium gun is still in service with the British Army, as is also a considerable amount of U.S.A. radar equipment. Vehicles, too, including the versatile jeep, of American origin are yet giving good service in the Army.

The provision of spares for U.S.A. equipment is just one of the many problems which are being tackled by the Equipment Branch of the Army. Although no solution has definitely been decided on it is probable that the answer will be that certain spares will have to be manufactured in the United Kingdom. Where this is not possible, owing to the complicated questions of copyright and international patent protection, recourse will have to be made to bulk purchase from the U.S.A., i.e. obtaining in one purchase sufficient quantities of stores and spare parts to satisfy our needs permanently.

To sum up, the reader may rest assured that no effort is being spared to make sure that the British Army equipment is not only of the finest conception and design, but that before it passes into service it undergoes the most rigorous trials and examinations, in order that the already high standard should be maintained and, if possible, set even higher.

C. J. FOLEY

CHAPTER XIX

PRINCIPAL FOREIGN ARMIES

THE UNITED STATES

In the United States the higher direction of war is the responsibility of the Joint Chiefs of Staff. They are advisers to the President, who is also Commander-in-Chief, and also to the Secretary of Defence. The Chairman of the Joint Chiefs keeps the Secretary of Defence informed of their proceedings. The Secretary in turn is responsible to Congress, and also represents the Services on the National Security Council, which co-ordinates military and foreign policy.

On March 31, 1950, the United States Armed Forces on full-time duty had a combined strength of 1,476,800, all of whom were voluntarily enlisted. The "Draft" law remains on the Statute Book till June 30, 1950, but of the four services—the Marine Corps is here regarded as the fourth—only the Army has ever had to use it. Since the introduction of improved pay and conditions of service, the Army too has attracted more volunteers than it can accept. On March 31, 1950, the strength of the United States Army was 603,100.

The General Reserve is stationed in the United States. It includes 5½ field divisions, together with corps and army troops, administrative services and supply battalions, and also four training divisions. The 5½ field divisions comprise the following: 11th and 82nd Airborne, 2nd Armoured, 2nd and 3rd Infantry, plus a regimental combat team that forms the nucleus of a mountain division. Of these, the 82nd Airborne Division is most nearly up to strength. The training divisions are the 3rd Armoured, the 5th and 9th Infantry, and the 10th Mountain Division: these are static replacement training centres.

Outside the United States itself, United States troops are serving in the following commands: Germany, Japan, the Pacific, the Caribbean, Alaska. The troops in Germany include the 1st Infantry Division and the Constabulary—which latter is the equivalent of a reinforced armoured division; the whole supported by two fighter groups amounting to about 150 aircraft. The troops in Japan include the 1st Cavalry Division (mechanised) and the 6th, 7th, 24th Infantry Divisions. Thus, as it stands today, the United States Army amounts to 10½ field divisions, plus the Constabulary in Germany.

Behind the United States Army as described above stand two other armies, the National Guard and the Reserve. On mobilisation the three are integrated to constitute a single army—the Army of the United States, which is controlled by one General Staff, and in which officers and other ranks are intermingled in accordance with the interests of the Services. Of the 4,000 m. dollars earmarked for the Department of the Army in the budget for Fiscal 1951 (begins July 1, 1950), the National Guard will receive 212 m. dollars, the Organised Reserve 115 m. dollars.

The National Guard is organised and trained very much on the lines of our Territorial Army. It differs from the latter, however, in that it is a State, as opposed to a Federal, organisation, into which State politics enter very largely. Military efficiency suffers accordingly. Ultimately, the strength of the National Guard will be 350,000, organised in 4,861 units. Already it is only 76 units short of this establishment, and these 76 units will be authorised in the coming year. At present the Guard contains 1 armoured and 21 infantry divisions fully manned. It will expand soon to two armoured divisions and 25 infantry divisions. The 5 divisions still oustanding are already very nearly complete.

The Organised Reserve Corps now contains 73,500 officers and 181,500 other ranks; it is to be increased by 70,000 additional officers and a number of specialists. It is organised in 25 divisions, primarily to facilitate administration and training. The Organised Reserve is an organisation completely distinct from the National Guard. There is a good deal of jealousy between the two.

The Army of the United States thus contains a total of some 63½ divisions. Only the 10½ divisions of the United States Army, however, and the Constabulary, would be fit for service at fairly short notice; the rest could not enter battle under a year. Moreover, much concern has been expressed in well-informed quarters in the United States over certain alleged shortcomings; among these are the failure to produce post-war models of tanks or anti-aircraft guns, and the post-war neglect of tactical as opposed to strategic air forces. Indeed, it is questionable whether, at the outset, the United States could supply the tactical air forces necessary to readjust the adverse balance over the battlefields in Europe.

According to tentative organisation tables, the typical field army of the United States will consist in future of three corps, each of four divisions. In each corps there will be one armoured and three infantry divisions. Obviously, the existing forces do not conform to this pattern.

The war establishment of a United States armoured division is 15,835 officers and men, with 58 light, 240 medium, and 75 heavy tanks. Its tank strength thus compares favourably with the 200 or so medium and 30 to 40 heavy tanks of the Soviet division. The United States at present uses the medium-heavy Patton tank as its heavy tank. An armoured division is organised in two combat teams and a reserve team. Its divisional artillery consists of 54 105-mm. and 18 155-mm. howitzers, and 60 light anti-aircraft weapons, all self-propelled but unarmoured. There are no anti-tank or armoured self-propelled guns; the tank itself is regarded as the primary anti-tank weapon. For close anti-tank defence the U.S. armoured division has 228 bazookas. Its infantry is carried in armoured track vehicles and thus has battle mobility greater than that possessed by the infantry of the Russian or British armoured division, who are carried in wheeled vehicles.

The United States infantry division has a strength of about 18,500 officers and men. The infantry division is the basic formation of the Army of the United States; as such it merits full description. It is the smallest formation that is composed of all essential ground arms and services and which can conduct, by its own means, operations of general importance. It can strike effectively, manœuvre readily, and absorb reinforcing units easily. It can act alone or as part of a higher formation.

The infantry division contains three elements: (1) Command; (2) Service; and (3) Combat—as follows:

Command Element:

- Divisional Headquarters.
- Divisional Headquarters Company.
- Reconnaissance Company.
- Signal Company.
- Military Police Company.

Service Element:

- Engineer Combat Battalion.
- Medical Battalion.
- Ordnance Company.
- Quartermaster Company.
- Replacement Company.

Combat Element:

- Three Infantry Regiments.
- Divisional Artillery.
- Heavy Tank Battalion.

The Commanding General of an infantry division has a General Staff and a Special Staff to assist him in the exercise of his command. His Chief of Staff is responsible to him for the four branches of the General Staff: G-1 (Personnel), G-2 (Intelligence), G-3 (Operations), G-4 (Administration). For operational convenience divisional headquarters is usually divided into a forward echelon and a rear echelon. The forward echelon consists of the minimum numbers necessary for carrying on tactical operations. The mission of the divisional headquarters company is to establish, maintain, and protect divisional headquarters.

The divisional quartermaster company is used to augment regimental transport for divisional supply and troop movement, for which purpose it has 48 2½-ton cargo trucks. The company also operates the divisional quartermaster office, divisional supply points, salvage point and the graves registration service.

The reconnaissance company is a command element; it is used for reconnaissance, with counter-reconnaissance and security as a secondary role. The company cannot carry out prolonged operations by itself.

The replacement company was added to the infantry division after World War II. The company receives, and prepares, replacements to join subordinate units of the division. It is capable of handling 200 replacements at a time.

The medical battalion is additional to the medical company within each infantry regiment and the medical detachments found within other elements of the division. It includes a headquarters and headquarters company, an ambulance company and a clearing company. The battalion evacuates patients from regiments and other elements of the division and rear areas.

On infantry regimental headquarters there are the following: a medium tank company (20 medium and 2 S.P. 105-mm. howitzers), a heavy mortar company (12 4·2-inch mortars), and medical, service, and headquarters companies. Thus the United States infantry regiment is much more of a self-contained entity than is the British infantry brigade.

The three infantry regiments are the main combat elements of the division. There are three battalions per regiment, each battalion about 900 strong. Each battalion is organised as a headquarters company, a heavy-weapons company (4 medium machine guns, 4 81-mm. mortars, 11 3·5-inch bazookas, and 4 75-mm. recoilless guns), and three rifle companies. Each rifle company is organised as a support platoon (3 57-mm. recoilless guns, 3 60-mm. mortars, and 3 2·36-inch bazookas) and three rifle platoons each with a light machine gun and a Browning automatic. The personal weapon is the M-1 semi-automatic rifle. The fire power of the battalion is thus very great. So too is the diversity of weapons and ammunition.

The divisional artillery of the infantry division contains 54 105-mm. and 18 155-mm. howitzers and 60 light anti-aircraft weapons (40-mm. and 0·5-inch m.g.s.). Of these, only the A.A. automatic weapons battalion is self-propelled. There are no anti-tank guns; here too the tank is the main anti-tank weapon.

The support of the divisional artillery would suffice to overcome no more than light resistance. For normal operations, reinforcing artillery from corps or army would be required. This might take the form of armoured S.P. 105-mm. howitzers or S.P. 155-mm. guns.

As will be seen from the above description, the Army of the United States is organised to produce post-mobilisation strength many months after a crisis has arisen. In a sudden emergency its strength would be small. Its finest quality is its flexibility in battle. This quality it owes in part to the high level of intelligence of its men and, for the rest, to its superb equipment—the products both of an incomparable industrial civilisation.

FRANCE

The armed forces of France at present number 629,421. Of this total the Navy accounts for 53,000; the Air Force for 68,000; the Army for 301,000. In addition there is a Gendarmerie about 53,000 strong. Of the French Army's 301,000, 168,000 are serving overseas, 120,000 of them in Indo-China, the garrison of which absorbs practically all the Army's long-service volunteers.

The Metropolitan Army, on the other hand, is mainly a conscript army. It is divided into two categories: field forces or forces of intervention, and forces for the local "*défence de surface.*" In France, Germany, and North Africa, five field divisions now exist, two armoured and three infantry. Two more are in process of formation. The ultimate target is 9½ first-line field divisions, when the necessary arms become available. As to that, France is to get at least 300 m. dollars of the 1,000 m. dollars appropriated by Congress under the Military Aid Programme. The material to be thus supplied up to July 1950, however, will do no more than arm existing divisions. France's own arms industry is only beginning at last to produce light vehicles and weapons. Notable among these is a 12-ton three-man tank, air transportable, and armed with a 76-mm. high-velocity gun. Critics complain that this tank lacks armoured protection and cross-country capacity.

That the French Army should grow strong once more is a vital need not of France alone but of all members of the Atlantic Union. Thus restored, that Army would be the most effective means to fill the military vacuum that now exists in Western Europe to our common peril. Besides being as poor as the rest of us, however, post-war France is bitterly divided on the question of rearmament. So the Army must subsist on a far too meagre budget. And all the time its strength is being drained by that running sore Indo-China.

West and East—the two problems indeed are one. The rebellion in Indo-China is a perfect example of the Politbureau's world strategy at work. On this Far-Eastern-cum-South-East Asian sector of a world front it is the French in Indo-China who are in the forefront of the battle. During the past two years they have had 120,000 troops engaged and these have suffered extremely heavy casualties. What the French are waging, particularly in Tonking, is far more than guerrilla warfare; it is a major war against a strong but elusive enemy adept in the use of mines and ambuscades: an enemy, moreover, who is now in direct physical contact with Communist China.

In this overseas commitment one-year conscripts can play no part; France's long-service volunteers have to bear the whole burden. Coloured troops and the Foreign Legion do their share, but the bulk of the task must fall to Frenchmen. Of what this tasks means the following facts will give some indication. Volunteers sign on for three years. As soon as they have completed four months' basic training, however, off they must go overseas, generally to Indo-China. Theirs is nominally a two-year tour overseas, but it usually works out at two and a half. Thus when the volunteers get home they are about ripe for discharge; unless, indeed, they elect to extend their service, in which case they will be due to go overseas again within another year.

Such is the prospect before the volunteers. Understandably, voluntary recruiting suffers; and the proportion of long-service volunteers who are left to serve at home is far too low. The shortage of technicians is particularly acute. This absence of old soldiers of all sorts adversely affects the metropolitan Army as a whole.

The metropolitan Army—other than that portion of it which is recruited in North Africa—is, of course, a conscript army. Unlike our national service registration and call-up, both of which are handled by the Ministry of Labour, conscription in France is the concern of the Statistical and Recruitment Department of the Army. Military claims have an absolute priority over those of industry. The conscripts or *appelés* are called up twice in the year only, in spring and autumn. From the point of view of training, this method is far better than our fortnightly call-up.

The annual class totals about 200,000, of whom the Army takes 150,000 to 180,000. Thus the Navy and Air Force depend almost wholly on volunteers. Conscripts now do 12 months' Colour service in all. Their first six months they spend as *bleus*, or recruits, in the Light Camps which are adjuncts of all units or groups of units of the metropolitan Army.

The underlying object of these Light Camps is to get the young soldiers out of towns and into hutted camps in the country. The conception was originally Marshal Lyautey's sixty years ago. General de Lattre de Tassigny implemented the scheme after the late war. The open-air lives led by the *bleus* in their Light Camps are very similar to those led by our own national service men at their arms basic training units. Training is intense; enthusiasm is still at its peak.

In the course of these first six months there are certain milestones. After two months, potential officers and N.C.Os. go off to the *Ecole de Cadres* at St. Maixent or Strasbourg or in Germany, where they remain till the end of their sixth month. Those left behind in the Light Camps devote their first four months to basic training. Volunteers also do four months' basic training at the Light Camps of their regiments. After these four months they are drafted overseas, generally to Indo-China. Conscripts pass on during their fifth and sixth months in the Light Camps to specialist training, as signallers, drivers, or infantry tradesmen or as junior N.C.Os.

At the end of six months the conscripts cease to be *bleus* and become *anciens*. At the same time they leave the Light Camps to join the duty companies or squadrons of their regiments in barracks. There they should—but seldom do—find themselves integrated with a due proportion, say one in three, of long-service volunteers. It is these companies or squadrons that go to constitute the field army of France at peace establishment. This change of status may take the *ex-bleus* only across the road or may mean a complete change of scene. Simultaneously, new batches of *bleus* fill the places they have vacated in the Light Camps.

By now the potential officers and N.C.Os. who have spent four months at the *Ecoles de Cadres* have also completed their first six months. Those of them who have passed the examination test required of officers—and their number may amount to 5 per cent. of the intake—now go on as Reserve Officer pupils to spend four to five of their second six months at the *Ecoles d'Application*, or specialist schools of their arms. Subsequently, during their twelfth or last month, they are attached to field units as *aspirants*, and at the close of their year's service they become Officers of the Reserve. On the other hand, those who have failed to make officer grade at the end of six months return to their Light Camps as full corporals to help to instruct the new batches of *bleus*.

At the end of a year all conscripts, whatever their status, revert to civil life. For another year, however, they are all held in what is called the *Disponibilité*; that is, they are still part of the Army and are liable to recall at the discretion of the military authorities, who are thus enabled in case of need to bring the duty companies or squadrons of the field army up to war establishment at short notice. After the year in the *Disponibilité*, the ex-conscripts pass into the First Reserve for a period of years not yet decided, but probably four; whence they will pass on successively for further periods in lower-category Reserves. The Reserves are liable to recall only by decree of the Council of Ministers.

The question is often asked: Does the conscript fulfil as an *ancien* and a reservist the bright promise of his first six months as a *bleu*? It is doubtful. At best, a year's training is all too short. Every moment counts. But when the *ancien* arrives in the barracks where he will spend his second six months, he seldom finds enough long-service N.C.Os. and men to initiate him into regimental life: too many of these old soldiers are now needed overseas. The leaven is not there. With luck the *ancien* may go on manœuvres during his six months of barrack life. For the rest, his time is taken up largely with guard mounting and similar routine. Equipment is apt to be all too scanty.

So the ex-conscript returns to civil life with enthusiasm damped. During his year in the *Disponibilité* he does no further training. By the time he reaches the First Reserve he is getting rusty. If he is not to forget all the lessons of the Light Camps he should now begin his reservist training. The Reserve officer stands in even greater need of this training than does the soldier, since all are agreed that the four to five months the Reserve officer spends as a pupil at the specialist school of his arm are far too short a time to make an officer of him, despite the miracles of concentrated training that are performed at these schools. Unfortunately, the funds voted for Reserve training are far too small to give the requisite number of officers and men the periodical field training they need. Thus an annual backlog of 100,000 or so untrained reservists is piling up. This fast-growing mass is in danger of forgetting what little they ever knew of soldiering.

Such, then, in brief, is the French military machine. In theory, the Army should be able to triplicate itself on mobilisation. The *Disponibilité* should bring existing units of the first line up to war establishment immediately, and should enable each unit to throw off a *noyau actif*, or kernel, amounting to about one-third of its strength. And the First Reserve, arriving on the heels of the *Disponibilité*, should expand each kernel into a second line unit. Indeed, the second line should be ready almost as soon as the First. Similarly, the second line should throw off its *noyaux actifs*—though on a descending scale—and these *noyaux* should be expanded into third line units by the Second Reserve. Thus, given the necessary arms, equipment, and time, the French Army should be able to mobilise well over 20 divisions.

A trial mobilisation recently held in the Paris area worked well: 97 per cent. of the men called up—they belonged to the *Disponibilité* and First Reserve—reported for duty, and of 2,000 registered vehicles almost all appeared. Yet no doubt anything up to 30 per cent. of the men involved were Communists. Frenchmen are unpredictable.

Many hold the view, however, that the machine will never work smoothly until conscript service has been increased to at least 18 months, in line with our national service here at home. An 18-months conscript could serve in Indo-China and thus release much needed volunteers. There appears to be no economic reason why the French Government should not take this course. French military expenditure in 1950 is standing at only 4·9 per cent. of the national income, in contrast with United States, British, and Dutch military expenditures, that stand at 6·4, 7·6, and 7·7 per cent. respectively. No doubt both Socialists and Communists in France would oppose any such increase bitterly. Frenchmen of 1950, however, might well recall how their fathers of 1913 raised the term of conscript service to three years in a time of national peril.

For the rest, it will be necessary to ensure three things:

1. That first line units of the metropolitan Army shall contain enough long-service volunteers to leaven the conscript mass;
2. That Reservists shall receive enough retraining to keep them reasonably efficient, and
3. That fighting equipment enough to outfit the units of all three lines shall be held ready in mobilisation reserve.

As yet the demands of Indo-China defeat the first object; shortage of funds defeats the second; the heterogeneous armament of the French Army—the legacy of the war—defeats the third. If only the nation will rally behind it, however, the Army will overcome all these difficulties. The Army is a reflection of the people. It is for the Right to overcome its fatalistic yearnings after neutrality, for the Left to discard its anti-militarism.

U.S.S.R.

In the late war the Red Army was a mass-produced army. Because of the almost total destruction of its forward elements in the opening phases of the war it had to pour infantry reinforcements on to the battlefield when these were still only half trained. Moreover, it used these half-trained masses with complete disregard of human life. Thus few Russian infantrymen survived long enough to become trained soldiers. It was this fact, coupled with normal Communist reluctance to allow initiative to subordinates, that conduced to the Soviet practice of attacking in columns of divisions on narrow fronts—a practice that facilitated rigid control.

In its offensives throughout the war it was the Red Army's almost invariable strategy to attempt double-envelopment. This Soviet strategy, however, was successful only when the Red Army could reckon on a superiority in numbers of at least four to one, supported by a corresponding superiority in artillery and armour. Moreover, the Red Army took months in which to prepare each major offensive. Given time, however, it could rely on the immense output of Soviet industry, together with Lease-lend, to provide it with almost unlimited supplies of equipment and ammunition.

Since the war the Soviet Army has been thoroughly reorganised and trained. No doubt, therefore, it is a greatly improved weapon. Its chiefs are men of proven ability. Marshal Vasilevski, for instance, who is now head of the Ministry of Armed Forces, was responsible for planning the Stalingrad counter-offensive. Later, he was Stalin's deputy and commander of an army group. Later still, he held the Far East command and overran Manchuria. Under the Soviet system of command Vasilevski is responsible for the Army and Air Force; there is now a separate Ministry of the Navy. Marshal Sokolovsky, formerly in Berlin, is now Vasilevksi's deputy. Koniev, whose army group swept across Czechoslovakia to Vienna, is Chief of the Land Forces. Rokossovsky, conqueror of East Prussia, is Minister of Defence for Poland. The Soviet Army, however, is still a mass-produced army, formidable primarily because of its vast size. The Russian soldier still lacks the ability to handle and maintain complicated equipment.

The Soviet Army is the world's largest conscript army; probably it has 3 m. men now under arms. Since the war it has conscripted over 1,200,000 men a year. Conscripts do two years' Colour service followed by about eight years in the reserve. Thus, on present form, the Soviet Army's trained man-power will have stabilised by 1954 at about 12 or 13 m. Meanwhile, in case of need, it can draw on its vast resources of war-trained men returned to civil life.

The Soviet Army works its conscripts much harder than do the armies of the West. Units are composed of men drawn from all over the Union, and these men rarely find themselves serving near their own homes. Whatever their origin, Russian conscripts possess great physical endurance and are accustomed to live rough. The training programme is extremely severe. Many of the conscripts—and particularly those from some of the outlying nationalities of the Union—lack education and intelligence.

Those of the conscripts who shape best, and who show themselves also politically reliable, are re-enlisted as Regular soldiers on the permanent staff. After attending courses at N.C.Os.' schools, those selected can hope for promotion accompanied by substantial rises in pay. The Soviet Army has no difficulty in enlisting from among its conscripts all the long-service volunteers it needs. The army as a career offers advantages in the shape of clothing, food, housing which the conscript could never hope for in civil life. Above all, the Russian soldier enjoys the respect of the Party, together with the high morale which comes of strict discipline and thorough training. Service in the Soviet Army confers prestige.

It is an army ruled by an iron discipline enjoined by Stalin himself. Discipline, thus understood, amounts to the religious observance of every minutest order or regulation. A superior is forbidden to overlook in a subordinate any shortcoming whatsoever. Other ranks must salute not only officers but also N.C.Os., and with a frequency and zeal undreamt of in Western armies. Punishments for military offences are extremely severe—the more so since, to the official punishment, is added the weight of public censure, always officially directed upon those who "let down the side."

OFFICERS

Over this blended mass of conscripts and regulars presides the officers' corps, holding itself rigidly aloof. It is Soviet policy to use every means to raise the status of the corps. From the vast number of officers who served in the late war the Soviet Army has now weeded out all but the more efficient. To those it has thus retained it has given no choice as to whether or not they would make the army their career.

Promotion in the corps is by selection. The factor which weighs most with the selectors is political reliability, though they consider also war records and educational qualifications. Pay and privileges increase rapidly with each rise in rank. Thus, while the pay of a General of the Army in the United States Forces is to the pay of a private in the ratio of about 15 to 1, the pay of a Marshal in the Soviet Army is to the pay of a private in the ratio of no less than 114 to 1.

The Soviet Army employs so many officers that it can afford to be lavish in their training. Thus, where officers of Western armies may be absent, say, for a year at their staff college or similar training establishment, Russian officers go on courses of two or three years' duration.

The main weakness of the officer corps is reluctance to accept responsibility. This weakness, which is inherent in the Russian character, is accentuated by Party discipline, which demands the most meticulous obedience. Thus the officers' corps must learn to be proficient in the art of what readers of Orwell's "*Nineteen-eighty-four*" will recognise as "double-think." In the military field the corps must be capable of initiative, yet it must remain blindly subservient in the political;

professionally it must be honest and open-minded, yet politically dishonest and dogmatic.

THE POLITICAL ELEMENT

In all this mental conditioning, the Kommissars, or Political Officers as they are now called, play a leading part. Ranking as "Deputy Commanders for Political Affairs," these Political Officers appear in every echelon of command above the company. They are responsible for the political education of the troops, and serve ostensibly under the command of their respective commanders. At the same time, however, they communicate, through separate channels of their own, with their own political superiors and inferiors, and are charged with the reporting of every instance of suspected disloyalty or neglect of duty. Below battalion level they rely on Party members in the ranks to keep them informed. In such conditions commanding officers can hardly feel secure.

Behind the Kommissars and controlled by the Politbureau stand the Secret Police, who include a uniformed and military force of 450,000 men. To the Secret Police, all men—even the most renowned of Marshals of the Soviet Army—are vulnerable.

ESTABLISHMENT

On its present peace establishment the Soviet Army contains nearly 200 divisions; at the peak of its war effort it contained about 600. Though Soviet Army divisions are generally much weaker in numbers than are their Western counterparts, yet they are little if at all weaker in fire power. The explanation is that their ratio of weapons to men is higher. To attain this higher ratio, the Soviet Army ruthlessly prunes its overheads—its staffs, cooks, orderlies, M.T. drivers, signals, engineering, and medical services, and the like. It does not follow, however, that the Soviet Army thus becomes a better fighting machine. True, some of these overheads it can afford to forgo because its men are accustomed to living conditions that more highly civilised Westerners would find intolerable. On the other hand, by forgoing certain other overheads the Soviet Army definitely sacrifices efficiency. The high ratio of guns to men in the artillery, for instance, means that the guns have to operate with fewer of those who, in the artillery of Western armies, man observation posts and communications, work out fire computations, and handle ammunition. In Western armies the artillery prefers to carry more overheads in order to obtain the maximal return per gun. In the Soviet army, too, there is no personal documentation of soldiers below the rank of major: the resulting wastage of manpower must be prodigious. Similarly, overheads in the form of adequate medical service in Western armies pay a dividend in lives saved, men returned to duty, and heightened morale.

The armour and artillery of the Soviet Army are generally accepted to be its most important arms. Both of these it handles on the pool system: that is, it holds vast reserves which it can use to reinforce decisive sectors of the front. The standard Soviet medium tank is the T.34, mounting an 85-mm. gun. Though the T.34 has been in service since 1941 it is still a useful medium tank. The heavy tank is the Joseph Stalin 3, mounting a 122-mm. gun. This is a powerful tank with a low silhouette, but it has little reserve of horsepower, and it carries only 28 rounds for its 122-mm. gun, whose rate of fire is low. Soviet tanks are mechanically reliable, but their finish is poor, as is their maintenance in the field. The tank output of Soviet industry and the accumulated reserve are very large. Another notable weapon in Soviet armoured divisions is the heavy 152-mm. S.P. gun-howitzer.

There are two types of armoured division in the Soviet Army, the tank division and the mechanised division. The tank division is designed primarily for short-range work in co-operation with infantry. Its strength lies mainly in tanks, supplemented by mortars and infantry. Its basic units are the following: three medium tank regiments, totalling about 200 T.34 tanks; one mixed heavy tank regiment of about 50 Joseph Stalin 3 tanks, and 25 152-mm. S.P. gun-howitzers; and a motorised rifle regiment of three battalions. The tank division has a strength of about 10,500 men.

The mechanised division is designed for more independent action; it has fewer tanks and more guns and infantry. Its basic units are the following: three motorised regiments, each of two battalions; one mixed heavy armoured regiment of about 50 152-mm. S.P. gun-howitzers and 25 Joseph Stalin 3 tanks; one medium tank regiment; one 122-mm. howitzer regiment; and rocket, anti-aircraft, and reconnaissance battalions. Its strength is about 13,000 men.

A mechanised army would consist of a suitable combination of mechanised, tank, and rifle divisions, perhaps five or six in all.

ARTILLERY

The artillery constitutes nearly 40 per cent. of the Soviet Army's strength. Generalissimo Stalin has called the artillery "the god of war." In the final assault on Berlin the Red Army is said to have deployed 22,000 pieces—that is, more than twice as much artillery as the Western Allies deployed in North-West Europe. As we know it today the Soviet artillery is the creation of Marshal Voronov, who is still at its head.

Voronov has organised the artillery in part as divisional artillery, which does not differ materially from the divisional artillery of Western divisions, and, for the rest, as a vast artillery reserve, some of which is at the disposal of armies and the balance in army group or G.H.Q. reserve.

This reserve artillery is organised in artillery divisions and even artillery corps. The artillery division has a variable composition. Normally its strength is about 10,000 men, and it includes regiments of 76-mm. guns, 122-mm. howitzers, 152-mm. howitzers, and 122-mm. guns: perhaps 150 pieces in all. Alternatively, artillery divisions may sometimes consist entirely of medium and heavy artillery. Whatever their precise composition, they perform, though on a larger scale, the same role as do Army Groups, Royal Artillery, in the British Army: that is, they are used as reinforcements wherever large artillery concentrations are required.

In the Soviet artillery radio and radar are provided on a comparatively low scale. Thus Soviet methods of fire control are not as technically advanced as those of Western Armies. This fact explains the Soviet predilection for short-range weapons adapted for area shoots, such as heavy mortars and rocket launchers, and for light 76-mm. guns which it uses very often for direct fire. All these equipments can be deployed in the forward area and demand a minimum of control.

When the Soviet artillery is given the time and information it needs for the preparation of a deliberate programme, whether in attack or defence, it can produce an annihilating weight of fire. To frustrate Soviet reconnaissance, therefore, and to perfect concealment and camouflage would be very necessary precautions. In order to simplify problems of control and support in a moving battle, it is the Russian practice to decentralise the command of a large portion of the artillery at an early stage. Artillery thus decentralised loses its power to concentrate its fire.

INFANTRY

There are two types of infantry division in the Soviet Army—the "new model" and the "old model" rifle division. Both are post-war creations, and they are identical except for the fact that whereas the transport of the new model division is wholly mechanised, of the old model the artillery and the reconnaissance battalion are still horsed. Both are about 11,000 strong.

In the rifle division there are the following basic units: the divisional armoured regiment consisting of about 55 T-34 tanks and 20 S.P. 100-mm. guns; the divisional artillery armed with 76-mm. guns, 122-mm. howitzers and 120-mm. mortars, about 72 pieces in all; and three rifle regiments, each of three battalions. A support unit in each rifle regiment contains S.P. 76-mm. guns, 120-mm. howitzers, and 57-mm. A.T. guns. In each rifle battalion there are three rifle companies and two heavy weapon companies armed with medium machine guns and 82-mm. mortars. Unless troop-carrying transport has been specially provided, rifle companies march on foot.

Divisional troops also include the usual signals, engineers, and medical and administrative services, but all on a scale much smaller than in Western divisions.

A rifle corps would consist normally of the following: two or three rifle divisions; a tank or mechanised division; and a small component of corps medium artillery. A rifle army would consist of two or more rifle corps, with a very large artillery component which might take the form of an artillery division.

CAVALRY

Throughout the war the Red Army made extensive use of horse cavalry, and undoubtedly would do so again in any future war. Horse cavalry was used for almost every sort of mission other than the attack or defence of fortified positions. It was particularly adapted to use on ground unsuited to other arms, and for missions against open flanks or behind the enemy's lines. Its success, however, was dependent on its use in mass—in formations, that is, as large as a corps.

A cavalry division is estimated to have a strength of about 5,000 men and to consist of three cavalry regiments and a small horse-drawn divisional artillery component. A cavalry corps would normally consist of three such cavalry divisions, together with corps troops which would include one or two regiments of medium tanks and S.P., anti-tank, and anti-aircraft artillery.

AIRBORNE TROOPS

As early as 1930 the U.S.S.R. had begun to train parachute troops, and it is believed to have entered the war with about 15 well-trained parachute brigades. After the German offensive had begun, however, the Soviet High Command found no opportunity to use these brigades in their proper role; instead, it had perforce to sacrifice them in the infantry battle in an endeavour to stay the enemy onrush. Asher Lee writes in his book *The Soviet Air Force*: "In the space of less than three fateful summer months the better part of ten years of intensive preparation and specialised training was virtually reduced to nought." Subsequently the Red Army re-created its airborne forces, but hardly ever used them—and never with success. To quote Asher Lee again: "The fact is that in face of strong opposition large-scale parachute operations are hazardous and expensive. . . . It was gloriously immoderate to train, equip, and organise nearly 100,000 skymen three times between 1938 and 1945, and thrice to put them back into battle with the infantry. But it was also proof of Russian flexibility."

Today the Soviet continues to train airborne troops and to build transport aircraft. In the light of past events, however, we may surmise that the High Command is thinking in terms of air transportation as a means of rapid reinforcement rather than of airborne offensives behind an enemy front.

RED AIR FORCE

Thanks mainly to the help of German technicians and the capture of German material, the Soviet Air Force has made immense progress since the war ended. Russian aircraft production is reckoned to be running at least 12,000 military aircraft annually, and it is generally estimated that the Soviet today has a first-line air strength of 18,000 military aircraft.

In the late war the Red Army Air Force amounted to 90 per cent. of the Soviet first-line air strength. The Ministry of the Armed Forces now maintains a strategic "long range air force" independent of the normal Army Air Force Command; but this strategic Air Force is still composed mainly of obsolete bomber aircraft and contains as yet no more than 200 or 300 B-29 type bombers. For the rest, the Soviet Air Force is reckoned to include in its first line no less than 7,500 fighters and as many more aircraft for the support of the land forces. Moreover, the backbone of these first-line air forces are high-performance jet-propelled fighters and fighter bombers which are being turned out at the rate of nearly 2,000 a year.

The highest Soviet air formation is the air army. An air army is composed of a number of air divisions and is of variable strength dependent on the situation. On occasions in the late war, when very large air concentrations of several thousand aircraft were made, a number of air corps headquarters were interpolated between air army headquarters and air divisions. On such occasions over 10,000 daily sorties were often made in support of one army group. An air division usually contains from three to four air regiments of about 50 aircraft each. Thus the strength of a division is around 150 to 200 aircraft.

The Soviet High Command does not observe the Anglo-American principle of centralised control of air power. In the Soviet organisation there is an air army under command of each land army group. Indeed, the command of air divisions is often de-centralised further to army corps or even armoured divisions, when these are operating in independent roles.

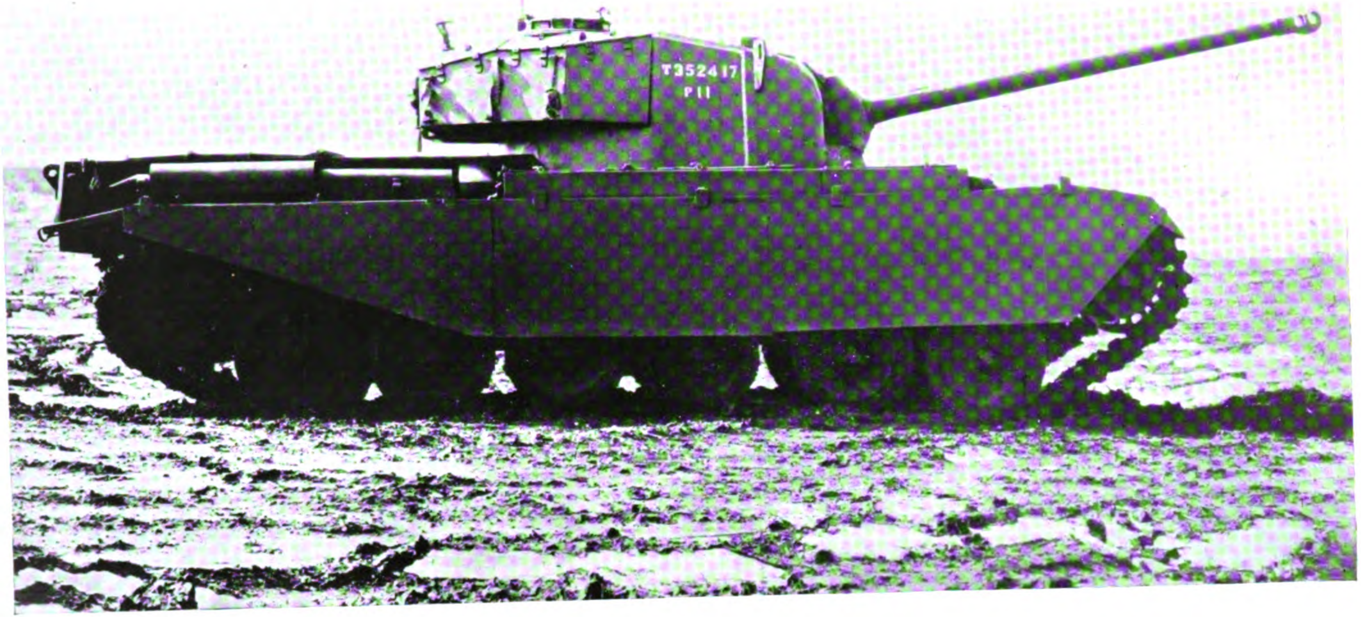
Such in brief are the Red Army's tactical air forces today. Mere numbers are no true gauge of their strength, since they lack both the firm basis of experience and many of the operational aids that make for the efficiency of the Anglo-American air forces. Yet Western Armies, with their memories of complete air superiority enjoyed during the closing years of the late war, would find conditions at the outset of another war very different. As Asher Lee remarks, "In Moscow they know that if the Soviet Air Force is rough, it is ready."

PARTISANS

No description of the U.S.S.R.'s military potential would be complete without a reference to partisan warfare. Radio, aircraft, parachutes, light weapons of great fire power—all these have vastly increased the potentiality of fifth columns. On the Eastern front throughout the war partisans waged underground warfare on a scale unprecedented. The direction of this underground war was all the more effective since the Party controlled both the Red Army and the partisan leaders. In any future war the Party will be ubiquitous. The forces of the Western nations, therefore, will have to reckon—whether in their own territories or in those of the enemy—with ruthless and powerful partisan forces cunningly directed. As General de Lattre de Tassigny warned a large body of officers recently, nowhere will be secure; always, headquarters must be located in reserve formation areas; formations must be organised for all-round defence; every man as he goes about his duties must be constantly on the alert far behind the lines no less than at the front.

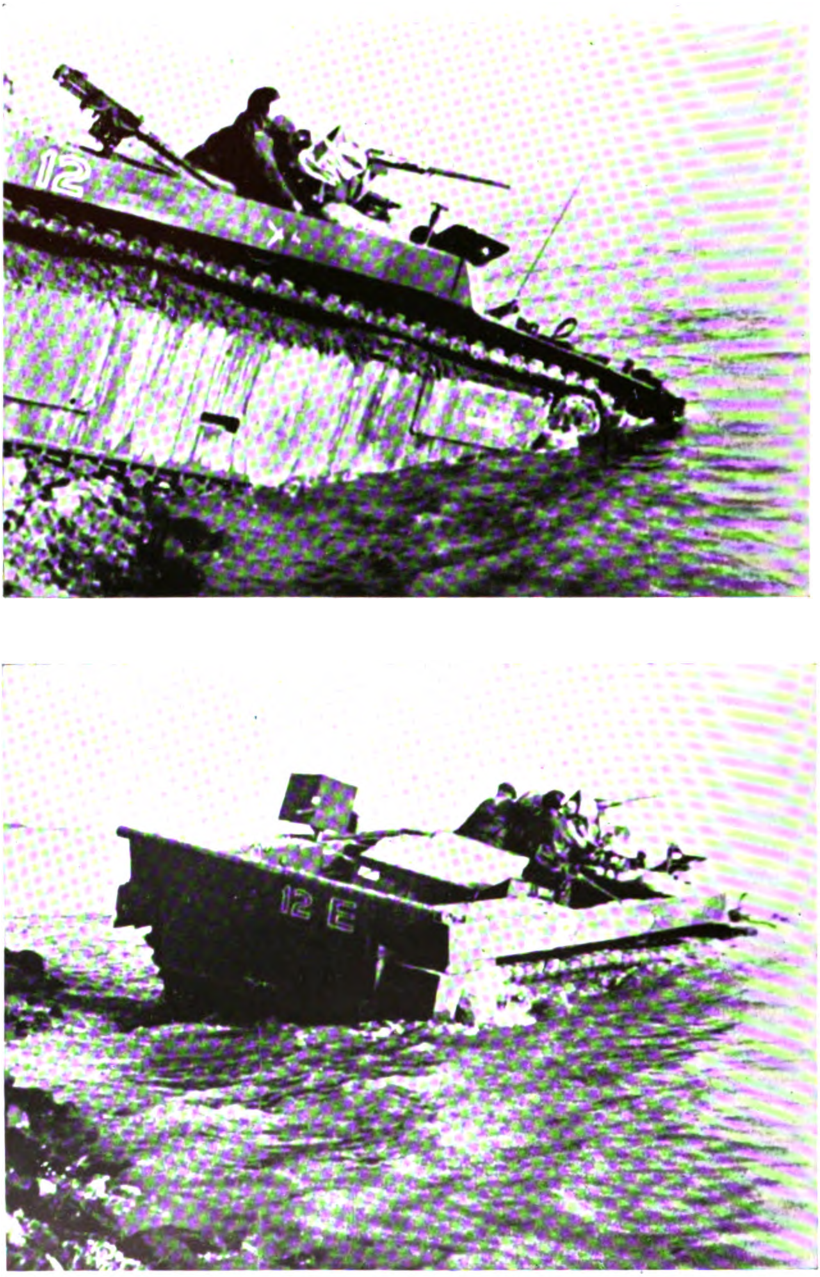
The Soviet army would be an extremely formidable antagonist. A weak point, however, might well be the rigidity of its plans. Commanders do not like to give initiative to their subordinates. In default of adequate radio, they must attempt perforce to control the battle by line communications. And they are mortally afraid of the consequences of failure. For the rest, just how formidable the Soviet Army would prove would depend largely on how far Russia's many peoples were united behind the Politbureau and how successfully the Western nations could create and exploit disunity.

H. G. MARTIN



British "Centurion" tank

By courtesy of the War Office



The "Buffalo"—an amphibious armoured tracked vehicle of American design and production—used by the British Army in North-West Europe (1944–45). *Top:* About to become water-borne. *Bottom:* Water-borne

By courtesy of the War Office

CHAPTER XX

CONDITIONS OF SERVICE IN THE ARMY

I. OFFICERS

A. NATIONAL SERVICE

THE WHOLE nation is affected by national service, and national service as an officer is, itself, a possible approach to a regular commission. From the moment a man is called up, the process of selection is begun, and normally, during the first four or five weeks in the ranks at an Arms Basic Training Unit, a man graded as a potential officer is sent for testing to a War Office Selection Board. The process of selection is dealt with in some detail below. Those men who pass the board go on at the end of their basic training (10 weeks) to an Officer Cadet School for a sixteen weeks' course, at the end of which the officer cadet is commissioned as a 2nd lieutenant.

Although the normal procedure is for a man to pass straight from basic training to an Officer Cadet School, this is not essential. Those who fail to get selected or who are not at first recommended can be selected for the Officer Cadet School at any time provided there is still time to complete the sixteen weeks' course before the end of their service.

The acceptance of a national service commission in no way alters the liability to serve. The national service officer leaves the service on the same day as the national serviceman called up on the same day. On commissioning, the officer will join his regiment or a unit of his corps, and is liable for service in any part of the world. For administrative convenience it is not usual to send officers to the more distant theatres if they have less than eleven months to serve. There is the opportunity also for service with colonial troops in West and East Africa. Within his unit, there is no differentiation between the national service officer and any other commissioned officer; he receives the same pay and allowances, serves in the same conditions, and has the same duties, responsibilities and privileges as a regular officer of the same seniority.

At the end of his full-time service (at present 18 months), the national service officer is liable for four years' training and service with the Supplementary Reserve or Territorial Army. This includes 60 days' training, normally completed in the Territorial Army at the rate of 20 days a year, including 15 days in camp, thus completing the obligatory training in three years; in the Supplementary Reserve, training will normally be four annual camps each of 15 days. Pay at normal rates is drawn during training. In addition to the training requirement there is a liability to be called up for whole-time service in any part of the world whenever the Royal Army Reserve or any part of it is called out by proclamation, and to be called out without proclamation for service in the United Kingdom for defence against actual or apprehended attack.

An officer who fails to carry out his training or duties satisfactorily, and is consequently called upon by the Army Council to resign his commission, becomes liable to be called up for the remainder of his national service in the ranks.

B. TERRITORIAL ARMY

Now, as before the war, the Territorial Army must rely on the voluntary spirit. The backbone of all units will be those officers who, after their war service, have joined or rejoined the Territorial Army. The advent of national service has, however, given new responsibilities and new opportunities. All units now have the task of training the national service officers and men posted to them for their four years' part-time service. These officers are borne on the national service list of the Territorial Army, but it is hoped that as many officers as possible will join the Territorial Army as full members and will remain on long beyond their national service. Only if large numbers do so will national service pay its full dividend to the nation. The grant of a commission as a volunteer in a Territorial Army unit is subject to the recommendation of the commanding officer and the decision of a district selection board.

The national service officer serving with the Territorial Army is required to do 15 days' camp training each year for three years, and a further 15 days' out-of-camp training over the three years. In assessing out-of-camp training, one six-hour working day or four drills count as a day. This is less than the training liability of the volunteer Territorial Officer, who has to do 15 days' camp training and 60 drills each year.

The future recruitment of officers for the Territorial Army will be chiefly from those who have held commissions during national service, but it will still be possible to obtain a commission from the ranks of the Territorial Army, on recommendation by the commanding officer and after selection by a War Office Selection Board, and a short Officer Cadet course instead of annual training.

G. SUPPLEMENTARY RESERVE

Commissions in the Supplementary Reserve may be obtained in the same way as in the Territorial Army. For national service officers the liabilities for service in the Supplementary Reserve are the same as in the Territorial Army; but in addition, an officer may volunteer for an additional liability to be called up for service outside the United Kingdom without proclamation when warlike operations are in progress or preparation. For this additional liability an annual bounty of £15 is payable.

The Supplementary Reserve is divided into two parts. Part I, which undertakes the additional liability referred to above, and Part II, which has only the same liability as the Territorial Army. Both Parts I and II are divided into two categories: "A," which does training in peace; and "B," which does not. The national service officer may not, therefore, carry out his four years' part-time service in Category "B" and will not be in Part I except as a volunteer. Training differs from the Territorial Army in that only annual training is carried out, and there are no evening or week-end drills. For the national service officer the training requirement is worked off by a 15-day camp training in each of the four years. There are some units in the Supplementary Reserve, but it is also organised into pools to provide reserves for the Regular Army.

The method of recruitment of officers other than national service is similar to the Territorial Army. The War Office publishes a comprehensive handbook showing the branches of the Service for which there is a Supplementary Reserve and the methods of applying for a commission.

REGULAR COMMISSIONS

The normal method of entry to a regular commission is through the Royal Military Academy, Sandhurst, or through a university. In addition, a limited number of regular commissions are granted direct to officers serving on national service or short-service commissions.

ROYAL MILITARY ACADEMY, SANDHURST

The ordinary entry to Sandhurst is by the Army Examination held by the Civil Service Commissioners in February, June, and October of each year, for candidates between 17½ and 18½. The standard of the examination is that which a boy might be expected to reach after one year in the 6th form at school. No boy is allowed to sit for the examination unless he holds a school certificate, and a boy who has taken the higher school certificate (which must either include mathematics or follow a credit in mathematics in school certificate) is exempted from the written examination. The standards under the new general certificate of education will shortly be published.

All boys who pass, or are exempted from the examination, are sent before a Regular Commissions Board, and if they pass are accepted for the Royal Military Academy, Sandhurst. Before joining they are, however, called up for four months' training in the ranks. This consists of the ten weeks' basic training course carried out by all national servicemen and the remainder at the school of the arm of the service in which they have been enlisted.

There are three examinations annually to fit in with those of the Royal Navy and the Royal Air Force, but there are two intakes only for Sandhurst. Boys who take the February examination are called up in November and join Sandhurst in March. Boys who take the October examinaton are called up in May and join Sandhurst in September. Those who take the June examination are divided between the call-up in November and May, so far as possible according to their wishes, but if necessary those who are exempted or who pass highest in the examination are selected for the earlier call-up.

It is hoped that acceptance for Sandhurst will, in the near future, depend on the competitive results in the written examination. That it has not done so so far is due not to a shortage of candidates, but to the high failure rate in the examination and a high rejection rate at the subsequent Regular Commissions Board. It is probable that this is due to the difficulties of education during the war years, and that this situation will right itself.

There is an alternative entry to Sandhurst through an Officer Cadet School. By this method any soldier serving on either a national service or a regular engagement may apply to become an officer. He is put through the ordinary training and testing procedure for the national service officer described above, and during his time at an Officer Cadet School he is sent to a Regular Commissions Board, and if successful accepted for the Royal Military Academy, Sandhurst. A candidate must be young enough to enter Sandhurst by the age of 19½, or in special circumstances by 21. This method of entry is intended for the boy who has genuinely been late in making up his mind that he wishes to try for a regular commission through the ranks; it is not intended that it should be used as a method to avoid the examination. In the first few intakes after the war a number of candidates were accepted who were below the desirable educational standard, but a new procedure has now been introduced by which the Regular Commissions Board will include an education test equivalent to the Army examination. Unless a candidate can pass this or show signs that he is likely to pass after three months' study, he is rejected. Where three months' study is necessary, it is given at a special wing attached to the Royal Military Academy, Sandhurst, and acceptance is conditional on passing the test at the end of the three months.

THE COURSE AT SANDHURST

The course at Sandhurst lasts 18 months. During this time the cadet is paid at the highest grade in the rank he has reached (minimum rate 5*s.* per day). The course is designed to prepare a candidate for any combatant arm of the service (i.e. other than chaplains, medical, dental, pay, veterinary, education, and legal). The syllabus, in addition to military subjects, comprises modern studies (history, political science, and economics), languages, science, and mathematics. The aim on the educational side is to continue the general education of the officer cadet along the line of a first year of a university course. The curriculum is divided into distinct courses so that a cadet may follow a particular bent. Cadets who intend to enter the Royal Engineers, Royal Electrical Mechanical Engineers, or Royal Signals are required to reach the standard of Intermediate B.Sc. by the end of their Sandhurst course. There is also a minimum standard in mathematics for candidates for the Royal Artillery.

In his last term at Sandhurst an officer is required to say in which arm of the service he wishes to be commissioned. He is given three choices of arm, and where one of his choices is Royal Armoured Corps or Infantry, he may within each one express three choices of regiment. The appointment of cadets to regiments is decided by the War Office Commissions Board, who are guided by three factors: first, the needs of the Army and the number of vacancies in each corps or regiment; secondly, the place of the cadet in the final order of merit; and thirdly, a family claim to a particular corps or regiment supported by the colonel commandant or colonel concerned. The last factor is weighted by giving a lead of a definite number of places to a cadet with a claim. Thus, for example, a cadet with a claim to a particular regiment who passed out 120th might be given preference over a cadet who passed out 90th, but not over a cadet who passed out 40th. The number of places lead given will depend on the strength of the claim. The appointment of officers who enter other than through Sandhurst is decided on a similar principle, though instead of the order of merit, consideration is given to previous service record, university degree, and grading at the Regular Commissions Board.

UNIVERSITY COMMISSIONS

It is desirable that a number of officers should be recruited each year from graduates of universities. A recognised member of a university may therefore apply for a commission and provided he obtains his degree and passes a Regular Commissions Board, he is accepted for a commission with the same seniority as if he had come in through Sandhurst at the normal age. Graduates with 1st and 2nd class Honours degrees are considered to have entered Sandhurst at their first opportunity, and those with 3rd and 4th class Honours and with pass degrees at their second opportunity.

Degrees are specified for certain arms so as to guide a university candidate into that arm of the service where his specialised knowledge will find fullest scope. The specifications are sufficiently broad to allow a candidate wide choice. For example, for Royal Engineers and Royal Electrical Mechanical Engineers, a candidate must have a degree in engineering or some other degree in which mathematics is included, while a degree in mathematics or natural science allows a candidate to enter any arm of the service. A degree without mathematics or science is suitable for Royal Armoured Corps or Infantry.

DIRECT ENTRY

A limited number of regular commissions for all arms are given to officers with national service or short-service commissions. This is a "back-door" method of entry, and since the educational training of the Sandhurst course or a university is missed, a candidate is not accepted before he has reached 21 years of age and given sufficient service as an officer to allow his qualities as an officer to be assessed. An officer granted a regular commission by this method may count all previous officer service and half previous service in the ranks in order to give him seniority from his 21st birthday, but not earlier. This method of entry is, therefore, less advantageous than the Sandhurst or university entry, which normally gives a date of first commission between 19¾ and 20¾.

As the minimum age for the grant of a regular commission by this means is 21, it will usually be necessary for a national service officer to take a short-service commission to tide him over. The minimum length of a short-service commission is two years, but where a short-service commission is given for the purpose of trying for a regular commission and the officer fails to be selected, he will be allowed to resign his short-service commission. Once a national service or short-service commission has been granted, entry as a university candidate is the best method and direct entry the next-best method of obtaining a regular commission. In certain special circumstances, however, a national service officer may be allowed to give up his commission to enter Sandhurst.

SHORT-SERVICE COMMISSIONS

The need of the Army is for a larger number of junior officers than the proportional requirement of senior officers will justify. National service officers go some way to meet this need, but as they serve as officers for at the most one year, it has been found necessary to retain in being the scheme of short-service commissions, which was introduced at the end of the war. This scheme allows for service as an officer up to eight years, at least two years on the active list, and the remainder on the reserve. A bonus is payable at the rate of £100 for each year's service on the active list, except for two-year commissions, for which the rate is £80.

The short-service commission will not appeal to the young man about to enter his chosen profession, but it may be useful for those who wish to enter a profession or business later at a mature age—say between 25 and 30. In addition, a short-service commission is the only form of commission other than a regular commission which is open to a regular soldier. The procedure for obtaining a short-service commission is as for a national service commission; thus it is necessary to pass a War Office Selection Board and complete four months' training at an Officer Cadet School.

PROCEDURE FOR SELECTION

Selection procedure is, in each case, based on the same principles: it is designed to give equal opportunity to all, and to test the capacity for leadership. The system is based on that which grew up during the war years, and may be said to have proved itself during that time. The tests are based on psychological principles, but they are carried out by ordinary regimental officers of experience, and are a straightforward attempt to assess character.

Like everything new, this selection procedure has met with a good deal of criticism. From among these critics many army officers and many schoolmasters have been enabled to attend selection boards in action, and it is noteworthy how often the visit has resulted in complete conversion. There is, therefore, a strong case for assuming that the selection-board system is better than the examination and interview which it replaces. It is, however, true to say that the system is accepted with no complacency; its results are kept under constant and searching review and the War Office is always willing to follow up a case where the board's results appear to be out of keeping with the candidate's school or other record. It is also apparent that the selection procedure is more easily applied to the mature candidate of 21 and over than to the 18-year-old, who in a completely strange atmosphere may occasionally fail to disclose his true self. Experience with the Sandhurst intake has also shown that apparent leadership qualities are not a complete substitute for knowledge; the boy with the inability to pass examinations often finds himself in such difficulties in competing with all that is new in the Sandhurst curriculum that he is unable to give his best. There is, however, good reason to assume that in the watchful atmosphere in which the selection procedure is being built up these difficulties will be overcome.

CONDITIONS OF SERVICE

All commissions are granted in the rank of 2nd lieutenant, and promotion in the lower ranks is by length of service. Provided an officer maintains the necessary standard of professional efficiency, including passing a promotion examination for the rank of major, he obtains promotion to lieutenant after two, captain after six, and major after 13 years' service. Rates of pay range from 13*s*. a day for a 2nd lieutenant up to 41*s*. for a major after six years, with "qualification pay" (e.g. for *p.s.c.* or the like) up to 5*s*. a day.

Above the rank of major, selection for promotion comes in to a gradually increasing degree. The officer of average ability who takes his profession seriously can expect to be selected for promotion to lieutenant-colonel. Of those promoted to lieutenant-colonel about a third may be expected to be promoted to colonel and brigadier, and one in five who reach colonel's rank may become general officers.

The ages for compulsory retirement and basic rates of pension are given below. Ages differ somewhat in different arms; those given are for Royal Armoured Corps, Royal Artillery, and Infantry.

	Age	*Basic Pension*
Major	45	£475
Lieutenant-Colonel ..	48	£625
Colonel	54	£825
Brigadier	54	£900
Major-General	57	£1,100
Lieutenant-General ..	59	£1,300
General	60	£1,500

Voluntary retirement is normally allowed below these ages; officers who are more than two years below the retiring age suffer a cut in pension. No officer with less than 20 years' service (served after attaining the age of 21 years) qualifies for a pension. An officer of 10 years' service qualifies for a gratuity of £1,000 with an increase of £150 for each further completed year's service. Officers within five years of commissioning from Sandhurst and those who within five years have undergone special instruction, such as staff college or university courses at public expense, are not normally permitted to resign or retire.

Rates of pay are designed to allow a reasonably economical and prudent officer with normal tastes and responsibilities to live on his pay. Special officer rates of marriage allowance are paid after the age of 25. Questions of sufficiency of income are so contentious and so subject to personal habits that it is difficult to generalise, but it is certainly a mistake to imagine that the majority of officers nowadays have private means. Some regiments are by tradition regarded as expensive, but even in these it is a question of community of interests rather than the size of income which matters.

WOMEN'S SERVICES

W.R.A.C.

The Women's Royal Army Corps has been established as a permanent part of the British Army, and so offers a permanent career for women officers. Service in the ranks is an essential preliminary to training as an officer, but a woman may apply for testing as an officer before enlistment, so that only if she passes the Regular Commissions Board need she actually enlist. Applicants must be over 18½ years of age and under 26, but a candidate is not called up until she is 19 and not normally commissioned before 20. Candidates must either have school certificate or show that they are of the equivalent standard of general education. The course at the Women's Cadet College is 9 months.

In addition to regular commissions, there are a number of vacancies for officers with short-service commissions, chiefly for specialist appointments, e.g. physical training, education, and intelligence.

Service in the Women's Royal Army Corps comprises both regimental duty with women's units and mixed units, staff appointments in normal Headquarters establishments, and secretarial, pay, and ordnance duties. Officers are liable to serve in any part of the world.

Rates of pay range from 9*s*. 9*d*. a day for a 2nd Lieutenant up to 57*s*. 9*d*. for a Brigadier. Pensions are at $\frac{4}{5}$ the rate for male officers, but otherwise subject to the same conditions.

R.A.M.C.

Qualified women doctors may be granted short-service commissions in the Royal Army Medical Corps, under exactly the same conditions as for men, that is, four years' service with no reserve liability, pay at full rates for male officers (with additional rates for specialists), and a gratuity of £600 on completion of service.

Q.A.R.A.N.C.

Nurses who have completed their training may apply for short-service commissions for four years in the Queen Alexandra's Royal Army Nursing Corps. At any time after completing two years, they may apply for a regular commission. Those who do not wish for regular commissions may extend their short-service commission to complete six years. Both regular and short-service commissioned officers are liable for service in any part of the world.

TERRITORIAL ARMY

There are Territorial services for both the Women's Royal Army Corp and the Queen Alexandra's Royal Army Nursing Corps.

E. K. G. SIXSMITH

II. OTHER RANKS

INTRODUCTION

"Shall I join the Regular Army?" At this very moment some young man is asking himself this question. The answer is a simple one: "If I am likely to enjoy Army life and am prepared to let the advantages outweigh the disadvantages—then yes. If, on the other hand, Army life does not appeal to me—then no." Many young men embark upon a job in civilian life which they do not like, but which they are prepared to stick to in the hope of one day making their fortune. In the Army there is no question of making a fortune—a military career is one to enjoy for itself from beginning to end and is not to be regarded as a stepping-stone to riches. Nevertheless the traditional field-marshal's baton can still be won by the soldier who starts his Army career as a private.

Army life must of necessity be vastly different from civilian life, despite the excellent and often successful efforts now being made to assimilate them. Here are some aspects of Army life, in no particular order, which do not always find a counterpart in civilian life: discipline (which irks the idle, but is recognised and appreciated by the real soldier); pride of Regiment; comradeship; communal life; wearing uniform; overseas travel; adventure; open-air life; sport; relief from worry about food, clothing, and lodging; relatively little pay; possibly a pension. Some of these aspects will appeal to the prospective recruit, some will not. If on balance he decides that he will like Army life—then let him enlist straight away; but if he is doubtful—then let him seek a career elsewhere. Only enthusiasts are wanted by the Army and there is no room for the man who is not prepared to throw himself wholeheartedly into the corporate life of his regiment. The essence of the Service is, in fact, service.

METHOD OF ENTRY INTO THE REGULAR ARMY

BOYS. There are Apprentice Tradesmen Boys and Regimental Boys. The former qualify at an entrance examination and join apprentice schools, where they are trained to be the future technicians of the Army. The latter join units of the various corps and regiments of the Army, where they are trained as potential leaders.

MEN. The usual procedure is for the volunteer to present himself at one of the recruiting offices to be found in every sizeable town in the United Kingdom. There he is medically examined, his references are checked and he undergoes an intelligence and aptitude test. Having satisfied the recruiting officer in all these respects, he is then sent to join a basic training unit.

WOMEN. The women's services are the Queen Alexandra's Royal Army Nursing Corps (Q.A.R.A.N.C.) and the Women's Royal Army Corps (W.R.A.C.). The former provides nurses and women who work in employment related to the medical services. The W.R.A.C., which is the much larger corps, provides a wide range of trades for women, who release men for more active duties. Their enlistment procedure follows the same lines as that for men.

TERMS OF SERVICE IN THE REGULAR ARMY

BOYS. The potential Apprentice Tradesman takes the qualifying examinations either at his school (under arrangements made by the local educational authority) or at a recruiting office. He may sit any of the half-yearly examinations, which usually take place in July and December, at any age which enables him to join an Army Apprentice Tradesman School between the ages of 15 and 16½. There are three of these schools, at Arborfield (near Reading), Chepstow, and Harrogate. He remains at this school for some three years, during which time he lives the life of a boy at a boarding school, and is not only trained in technical subjects but also continues his general academic education. At the end of his time at the school he should have reached a high enough technical standard to become a technical tradesman after a few months in his corps, and moreover he will be a jump ahead of the ordinary recruit who joins at, say, 18 years of age. An Apprentice Tradesman is required to serve a minimum of 8 years with the Colours from his 18th birthday.

A potential Regimental Boy may enlist any time after school leaving age (usually 15). He does this at a recruiting office where he has to pass a medical examination and an intelligence test. He serves in a special boys' unit, for example the Boys' Battery, Royal Artillery, or the Boys' Squadron, Royal Signals, until he reaches the age of 18, when he comes on to man service and takes his place in the normal life of the Army. Like the Apprentice Tradesman, he receives both technical and academic instruction, and on reaching man's service stands a very good chance of early promotion. He also is required to serve for a minimum of 8 years with the Colours from his 18th birthday.

For both Apprentice Tradesmen and Regimental Boys, parents' consent is necessary before enlistment.

MEN. A man may enlist any time after 17½ and up to the age of 30, this upper age limit being extended in the case of certain categories and trades and for ex-servicemen. He may enlist on any of the following types of engagement: 5 years with the Colours and 7 with the Reserve; 7 years with the Colours and 5 with the Reserve; or 12 years with the Colours (with no Reserve liability). He may moreover change from one engagement to another longer one at any time after he has one year's service.

There is a special engagement of 3 years with the Colours and 9 years with the Reserve for the national serviceman providing he enlists either during his national service or within six months of completing his national service. He too may change this engagement to any of those mentioned above whenever he wants to. Finally, a man may extend his original engagement to one of 22 years (when he qualifies for a pension) and thereafter he can contract for a further 1 to 5 years.

WOMEN. A woman may enlist for Q.A.R.A.N.C. or W.R.A.C. between the ages of 17½ and 30, this upper age limit being extended in the case of certain trades and categories and for ex-servicewomen. She can enlist for an initial engagement of 3 to 4 years and thereafter may extend her service (by stages if she wishes) to 11 years. In her 11th year she can extend again for another 11 years, making a total of 22 years, when she qualifies for pension. There is, of course, no Reserve service for women.

PAY

BOYS. 10*s.* 6*d.* to 17*s.* 6*d.* per week until the age of 17½, when they come on to man's rates.

MEN. A *Private* starts at 28*s.* on joining. Thereafter he is paid according to his proficiency, which is assessed on what is known as the "star" system; thus a three-star private earns 45*s.* 6*d.*

A *Corporal* with one star earns 52*s.* 6*d.*

A *Serjeant* earns from 84*s.* to 108*s.* 6*d.*

A *Warrant Officer* earns from 101*s.* 6*d.* to 150*s.* 6*d.*

Married Men draw the usual 5*s.* family allowance for the second and each subsequent child, but in addition receive an Army marriage allowance which works out at a flat rate of 42*s.* for men up to the rank of corporal, 49*s.* for serjeants and 56*s.* for warrant officers.

PENSIONS

Other ranks earn a pension after completing 22 years' service from the age of 18. The rates for pension vary with the ranks held and total service, but an average pension for a serjeant is about 34*s*. Although in terms of cash this may not seem a great deal, a man would have to save a large amount of money before he could draw so much interest on it each week.

Reserve Pay. From 1*s*. to 2*s*. per day.

WOMEN

A *Private* starts at 21*s*. on joining, and thereafter she is paid on a "star" system similar to that for the men. Thus a three-star private earns about 35*s*.

A *Corporal* with one star earns 39*s*. 1*d*.

A *Serjeant* earns from 63*s*. to 70*s*. 7*d*.

A *Warrant Officer* earns from 75*s*. 10*d*. to 119*s*.

Pensions. An average pension for a serjeant after 22 years would be 23*s*. 11*d*.

N.B.—The above rates of pay for men and women take into account the fact that clothing, food, and lodging are provided free, except that married men, provided with married quarters, pay rent.

NATIONAL SERVICE

So long as the Army's commitments remain of the same order as they are now, it is likely that national service will go on. Even if the required number of regular volunteers suddenly became available, their absorption into the Army would have to be spread over a number of years in order to avoid a wholesale run-out some 5 or 7 years later. In any event, it is very difficult to see how we could produce the number of trained reservists needed to reinforce the Army in time of war without some form of national service in peace.

The balance of regulars to national servicemen is one of the Army's greatest problems. Fewer regular recruits mean more national servicemen; more national servicemen means more regulars to train and look after them, which in turn means more regulars taken away from their many other worldwide commitments. This leads to disturbance and instability in the life of both regular and national serviceman—and nothing could have a worse affect on regular recruiting than that. More regulars mean both happier regulars and happier national servicemen.

The first step towards national service is when the young man registers at his local Ministry of Labour office, which he is instructed to do through the medium of the Press and B.B.C. It is at this stage that he must look ahead and plan his educational future. He may want to do a five-year apprenticeship with a civilian firm before doing his national service, in which case he must ask the Ministry of Labour for deferment of call-up. On the other hand, he may want to do his national service immediately so that at the end of it he will be able to go straight to a university at the beginning of term—in which case he may have to ask the Ministry of Labour for early call-up. The Ministry of Labour will always try to help the genuine student.

Some weeks after registration the man will receive instructions to report to a Ministry of Labour Medical Centre, where he will be medically examined and interviewed by a military interviewing officer. Again some weeks later he will be given at least 14 days' notice to report to a certain Army basic training unit, and on his arrival there the Army will assume responsibility for him.

The national serviceman does 1½ years' whole-time service anywhere in the world (at the present about one third serve outside the United Kingdom), and is then transferred to the Supplementary Reserve or Territorial Army for another 4 years' part-time service. During this latter period he is required to do 60 days' training. In the Supplementary Reserve this will be in four fortnightly camps; in the Territorial Army probably in three fortnightly camps and the balance in evening drills.

CHOICE OF REGIMENT

Both regular recruit and national serviceman can opt for a particular branch of the Army. The regular, providing he passes the required medical selection standard, will be posted to that branch. The national serviceman's wishes are also considered, but naturally he must be sent to the branch where he will be of the most use to the Army during his short period of whole-time service. The fact that a national serviceman has Certificate A or T (obtained in a Cadet Force) entitles him to priority in choice of regiment.

The corps and regiments open to a man are as follows:

Royal Armoured Corps (this includes Cavalry Regiments and the Royal Tank Regiments).
Royal Artillery.
Royal Engineers.
Royal Corps of Signals.
Foot Guards
Infantry of the Line.
Army Air Corps (this includes the Glider Pilot Regiment and the Parachute Regiment).
Royal Army Service Corps.
Royal Army Medical Corps.
Royal Army Ordnance Corps.
Royal Electrical and Mechanical Engineers.
Corps of Royal Military Police.
Royal Army Pay Corps.
Royal Army Veterinary Corps.
Royal Army Education Corps.
Royal Army Dental Corps.
Intelligence Corps.
Army Catering Corps.

With the considerable increase in the technical side of the Army it has been found necessary to reduce the number of infantry battalions. This has given rise to the "group system" under which some six regiments from the same part of the country, or of the same type of regiment (e.g. Light Infantry) are grouped together. A regular recruit may opt for a particular regiment within the group; but he will only be enlisted into the group, although his choice of regiment will be respected whenever this is possible. The aim is for his first posting to be to his regiment of choice, but later he must be prepared to serve with any regiment of the group.

SELECTION

During the war the military machine had to be speeded up to cope with the vast number of men coming into the Army and it was essential that no time should be wasted in a man being trained for a job for which he was not entirely suited. After much research, tests were devised to measure each individual's intelligence, aptitude, and attainments so that he might be directed to serve in a type of employment in keeping with his qualities. As well as the test, each man was interviewed by an officer specially trained in this work. This procedure has been continued in peace-time, is now firmly established and has been copied by several other armies and indeed has caused great interest in industry. When one remembers the large number of men now serving in the Army, the proportion of square pegs in round holes is extremely small.

WELFARE

The Army takes great care to ensure that its officers and soldiers get a square deal, and one Directorate in the War Office is charged with what in the Army is called "Personal Services." Within this wide term are included such matters as ensuring that the soldier's pay and allowances are kept constantly under review; that men are not penalised unfairly or illegally or victimised in any way; that the man's right of appeal to higher authority is respected; and that a general standard of fairness and equity is maintained throughout the Service. Within the unit itself the commanding officer is responsible for the welfare of his men, and this is rightly considered to be one of his first duties—for in the Army efficiency and happiness go hand in hand.

RESETTLEMENT

Although the Army likes to have men staying in for a long career, it must be remembered that this "long" career is only part of a man's life and even after 22 years' service the man will find himself back in civilian life at the age of 40 or so. Over one hundred Army trades are now recognised by trades unions, which means that skilled men in such trades are able to find employment immediately after discharge. But such men represent only a small percentage of the Army and the majority of men require some degree of training to fit them for civilian employment.

The Army has an established Resettlement Advice and Information Service, and every man is interviewed after one year's regular service to find out what type of civilian job he will eventually require. Thereafter he is kept on the right lines by such means as general educational instruction from his unit education officer and by correspondence courses dealing with his proposed civilian work. At the end of his service he can attend a training course at the Army College or can be attached to a firm to learn the job at first hand. After he has left the Army the Ministry of Labour looks after him (having received advance details from the Army Resettlement Advice and Information Service) and will help him to make use of the concessions now being made by Government Services and industry in the training and employment of ex-Regulars. In all this work of resettlement, invaluable help is given by the National Association for the Employment of ex-Regular Sailors, Soldiers, and Airmen.

TERRITORIAL ARMY

Hitherto an entirely voluntary organisation, the Territorial Army now consists partly of volunteers and partly of national servicemen who still have four years' part-time service to fulfil. The volunteer element remains the core of the Territorial Army and in its hands lies the power to make the Territorial Army a vital part of the great military force which the country will want in time of war. The national serviceman is encouraged to join as a volunteer, instead of being arbitrarily posted; by so doing he will have every chance of going to the unit he wants and of retaining the rank which he achieved during his full-time service; moreover, he will receive a bounty.

SUPPLEMENTARY RESERVE

This also used to be an entirely voluntary organisation, but now consists partly of volunteers and partly of national servicemen. Unlike the Territorial Army, whose units are organised entirely on a local basis, the Supplementary Reserve is organised mainly on a functional basis and the men in any one unit may come from all parts of the United Kingdom. The reason for this is that the Supplementary Reserve is primarily technical, and it would obviously be undesirable to raise a technical unit in the area of a large factory and so denude that factory in time of war. Some of the volunteers in the Supplementary Reserve train in peace-time and others do not; every national serviceman, however, trains during his four years' part-time service. National servicemen are encouraged to volunteer in the Supplementary Reserve, just as they are in the Territorial Army.

M. M. A. R. West

CHAPTER XXI

CURRENT ARMY PROBLEMS

THE THREE problems discussed in this chapter—man-power, specialisation, and training facilities—are those which strike the writer as being the most pressing, and ones which affect not only the Army but the nation as a whole. The opinions expressed have no official backing and the problems themselves are not necessarily those regarded officially as the most important.

MAN-POWER

After a national war of the magnitude of that of 1939–45 there is invariably a reaction against military service. This is so in all countries, but particularly in our own, where the inclinations of the people are towards peaceful pursuits rather than warlike preparations. In spite of the present clear necessity for strong defence forces it has been found impossible to raise the required numbers by voluntary enlistment and we have been forced to adopt conscription—or, as we call it, national service. This is applicable to all three fighting services; but affects the Army more than the other two because of the greater numbers involved. We have, therefore, an Army comprising two categories of men and women.

(*a*) *Volunteers* (men and women), who provide the Regular long-service Army and part of the personnel of the Territorial Army.
(*b*) *Conscripts* (men only), who provide the short-service element of the Regular Army, and on completion of their period of 18 months' whole-time service join the Territorial Army on a part-time basis.

This system will eventually provide us with a fine reserve of trained officers and men ready to meet an emergency at short notice. However, it meets our overseas requirements only with difficulty—due partly to the fact that 18 months' training is insufficient to enable a man to serve for a useful period in a Regular unit, and partly because of the distance to some of our heaviest overseas commitments (Malaya and Hong Kong), which still further reduces the useful period of service of the 18 months' national serviceman.

It is clear that there are two possible ways of remedying this state of affairs:

(*a*) by increasing the period of whole-time service of the national serviceman to 2 or 2½ years—or whatever is considered necessary; and/or
(*b*) increasing the number of men in the long-service professional Regular Army.

Of these (*a*) has obvious objections. It still further handicaps the young man on embarking on a civil career. It hinders industry and tends to make military service even less popular than it is. The proposal to increase the size of the long-service Regular Army is more attractive and more practicable. The numbers obtained (approximately 185,000 on April 1, 1950) are not inconsiderable and there is little doubt that an increase of pay and pensions and better living conditions would result in the required number of volunteers. The problem is not, however, without difficulties—one of which is that an increase in Regular Army pay would have to be accompanied by a similar increase in the other two Services. If whole-time conscription, even in a modified form, were retained it would almost certainly be necessary to increase the conscripts' pay, as one could not have two rates of pay for men performing similar duties. The cost would, therefore, be very heavy, and up to now the Government has not seen its way to adopt this method. Moreover, the organisation and terms of service of an Army backed by adequate reserves is a long-term project and any *major* changes designed for ultimate improvement will amost certainly result in a temporary check in efficiency and some hardship to individuals. Any serious alterations in policy call for the most careful consideration and reasonable certainty that they will be successful and lasting.

Broadly speaking, there are three shades of opinion in connection with army man-power policy.

(*a*) Many, probably the majority, favour the continuance of the present policy, with minor changes designed to improve recruitment to the long-service Regular Army.

(*b*) A small minority would like to see conscription abolished and an all-out drive to bring the Regular Army up to the required strength.

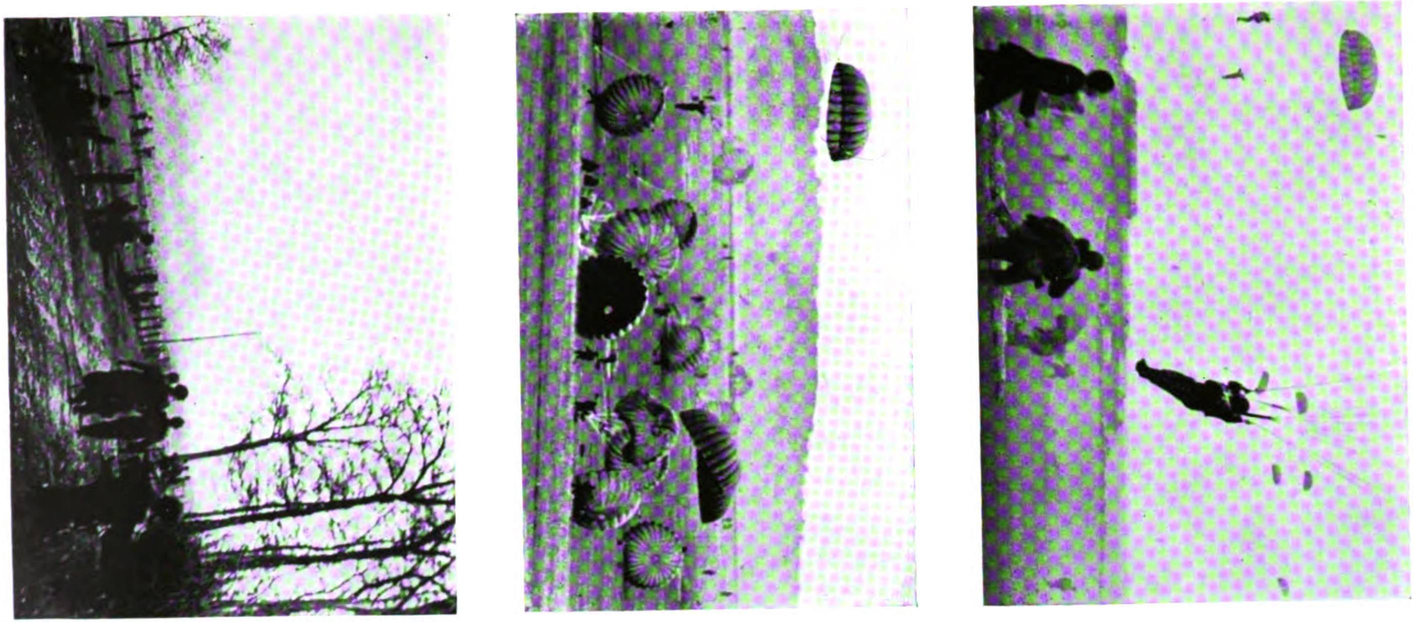
It would appear that this course might have serious political repercussions on friend and potential foe alike.

(*c*) A considerable body of well-informed opinion considers that the Regular Army could be made sufficiently strong in long-service men to fulfil our overseas commitments, with perhaps the addition of a few "selected" national servicemen to bring units in Europe up to establishment. Apart from the latter, conscription would be confined to part-time service in the Territorial Army.

It cannot be denied that the present situation is unsatisfactory. The problem confronting the authorities is whether or not a radical change of policy is wise in the light of our pressing and serious short-term commitments—bearing in mind that *major* changes are rarely accomplished without a temporary check. If a change of system *is* possible, that outlined in (*c*), or a similar one, has much to commend it. If it could be accompanied by the formation of a Colonial Army—recruited mainly in Africa and organised on the lines of the old Indian Army—it might go far towards solving our present man-power difficulties and, by eliminating whole-term service from the conscript, do much towards providing more men for industry.

THE OFFICER

The foregoing paragraphs have dealt with the problem in general terms and are mainly applicable to the rank-and-file. It has been shown that the position is unsatisfactory and is likely to remain so until such time as



British airborne troops coming into action

Top: About to land
Centre: Just after landing
Bottom: Forming up to engage the enemy

By courtesy of the War Office

the general world situation improves or a better plan for using Service man-power can reach fruition. This makes it all the more important to provide an adequate number of officers of the highest professional standard. The situation in the Regular Army is that, while sufficient numbers present themselves for commissions, so many fail at the qualifying examinations, tests, and interviews that the final result is a shortage. Wisely the War Office prefer quality to quantity and decline to reduce the standard. Nevertheless, it is imperative to increase the number of good-quality candidates who will ultimately become officers.

The chief reason for the shortage appears to be lack of security. Candidates themselves, and their parents and guardians, are not attracted to a profession which offers pay on which they cannot save and in which a high proportion will be compulsorily retired at a comparatively early age, with a pension on which they cannot live and without prospects of, or training for, well remunerated civil employment. The problem is a very difficult one and governed by two simple factors:

(*a*) In the interests of the Army it is necessary that higher commanders be reasonably young—which means that many officers must retire before reaching the age of 50—some much earlier.
(*b*) In the interests of the individual it is essential—especially for the married man with children—that he remain in active employment up to the age of, say, 60.

Without some special scheme of post-army service employment it is beyond human ingenuity to reconcile these two conflicting requirements. It should not, however, be difficult to devise a scheme for guaranteed after-service employment for officers in view of the large number of civil appointments which nationalisation has placed at the disposal of governments. If such a scheme could be combined with an acceptable plan of inexpensive education for officers' children, the problem would be near solution.

SPECIALISATION

Under modern conditions every undertaking of any size requires a high degree of specialisation among its personnel. The decision to create a specialist appointment or a specialist group or unit is, however, one which demands very careful thought—the main consideration being whether the specialised duties are sufficiently important, and occur sufficiently frequently, to justify the whole attention of one or more individuals. A simple, although facetious, example is an ordinary motor bus, which normally requires two specialists—one driver to drive it and carry out simple maintenance and minor repairs, and one conductor to collect the fares, supervise the seating of passengers and to give the signals to the driver to stop and go on. Both these specialists are necessary and both are economical because their duties are performed almost continuously. If a third man were employed—for the express duty of ejecting drunken passengers—it would be grossly uneconomical and a violation of the "worth-while" principle, because the number of drunken passengers would be very small and in consequence the new specialist would spend most of his time in idleness.

In a complex organisation, such as a modern army, it is necessry to train a very large number of specialists—some for serving complicated weapons, dozens of kinds of tradesmen as in industry, numerous types of wireless operators, and many others. Some of these are so important as to justify their existence although their specialist duties are not full-time. A specialist once established is very difficult to get rid of. He and his superiors vie with each other in extolling the essential nature of his duties. The periodical review of individual specialist appointments, and the abolition of those which become redundant, is a very big problem which we can be certain the authorities have in hand. There is, however, another form of specialisation which requires no less vigilance and, where necessary, no less ruthless measures to correct redundancy. During the war years the speed at which training had to be carried out, the special circumstances of particular campaigns, and the pace at which complicated technical equipment came into service, made it necessary to form many specialised units. Some of these have survived the war and acquired a degree of permanence which many consider unjustified.

Perhaps the best example of this is the specialisation which took place within the Infantry. In 1940, after Dunkirk, Commandos were formed, and were no doubt necessary at that time, for conducting raids and keeping up some semblance of offensive action. As the war progressed and other troops became better trained and better armed, the value of Commandos was questionable. They could accomplish little more than other well trained Infantry; they tended to be regarded as only suitable for certain special tasks, which did not occur very frequently. No one denies that they fought with superb skill and bravery, but they often spent weeks inactive, while their comrades in the "ordinary" Infantry remained in close contact with the enemy for months at a time. Now it is generally accepted that these "storm troops" are superfluous in a highly trained army.

Another form of specialisation—confined largely, but not entirely, to Infantry—is the airborne arm. These troops were almost indispensable in the war, and the two British airborne divisions, together with similar American formations, played a great part in the campaigns in Europe. In the later stages of the war they fought for long periods at a time, not only in an airborne but frequently in a normal role. In the main, however, they were reserved for special operations and in consequence spent long periods inactive. Had it not been for factors peculiar to war conditions at the time, they would have represented a very uneconomical use of man-power. Airborne formations and units still form part of the British Army, but it is for consideration whether they are still necessary. The airborne technique is simple and once the airborne soldier reaches the ground he fights in the same manner as anybody else. In modern conditions, parachuting and glider landing are not unduly hazardous and certainly demand no more courage than an armoured or infantry assault across open country in face of a determined enemy. There is much for the contention that in a modern army all fighting troops should be trained in an airborne role and that it is no longer a duty for the specialist.

ARMY TRAINING FACILITIES

The training of the individual soldier presents much the same problems today as in the past. Given good organisation and sufficient capable instructors, there are no insuperable difficulties; in fact, modern developments—such as the ease and speed of transporting men from one place to another and the added facility provided by the cinema and other inventions—tend to make the task easier. Although the technique has changed out of all recognition, no more space is required, and no more apparatus, than modern industry can provide.

The situation is, however, very different when it comes to collective training—the conduct of large-scale exercises with mobile cross-country vehicles, the co-operation of the Royal Air Force and (if the exercises are to be realistic) the use of live shells and other large destructive projectiles.

Exercises of this kind, on the largest scale, require areas of hundreds of square miles in extent, and if they are to be of full value the troops and their vehicles must be permitted to deploy off the roads and, in certain types of exercise, fire their weapons without restriction. The necessity for this was accepted during the war when huge areas of farm land, including villages, were taken over by the Army and R.A.F. for training purposes and for operational airfields. Much damage was also done to other land not actually taken over. In peace, however, these conditions cannot be entertained in a thickly populated country striving to ease its economic difficulties by producing the maximum amount of food from its own soil. Consequently the Army's training is confined to comparatively small areas of unproductive land which cannot give scope for proper training on modern lines. Yet without these facilities the troops and staffs will lack the experience necessary in war.

This deficiency in training requirements is not a new problem. It had existed for some years prior to the war; but has become more acute with increases in the range of action, speed, and weight of cross-country vehicles. Most people whose judgment is worth considering and who fought at Dunkirk would agree that our troops were handicapped, and incurred avoidable casualties, by the lack of training grounds in the years before hostilities. The situation was similar in Malaya, where even a few weeks before the Japanese invasion the most superficial damage to a rubber plantation, by troops exercising, was looked upon as an unforgivable crime. The units which met the Japanese in Malaya were not sufficiently trained for the task because they had been denied the manœuvre facilities which were essential.

The solution to this problem is not easy to find. At home it is clearly impossible to provide ideal conditions for training large forces; but fortunately the problem is not at the moment a pressing one, as our large overseas commitments have reduced the number of fighting troops quartered in the United Kingdom to proportions within the capacity of the Army's regular training areas. This will not always be so, however. In the years to come when we again have a powerful home-based army its training requirements will demand serious consideration. While we have the breathing-space we should explore every possibility. The Highlands of Scotland and other thinly populated areas not devoted to serious agriculture offer a possible solution. The feasibility of transporting large forces to North Africa—not annually, but once every three, four, or five years—for exercises, requires investigation. The actual movement of such a force by sea would in itself be an invaluable experience and could be made part of a combined exercise with the other two services.

In some overseas stations—such as most parts of Africa—facilities for collective training are good. In others—such as Gibraltar and Hong Kong—lack of space makes conditions even worse than at home. In the former the ease with which troops could be transported to North Africa for periodical training provides a ready solution. In Hong Kong there is no good solution other than relieving the troops frequently and sending them to better training stations. Obviously the long distances involved and the expense of frequent reliefs make such a course very difficult.

Unfortunately it would appear that one of the most necessary training requirements—namely, large-scale exercises over "hedge and ditch" country of the type found in most parts of Europe—can never be fully met. Country of this kind is invariably good farming land and the movement over it of highly destructive tracked vehicles in large quantities cannot be contemplated in peace.

C. N. Barclay

CHAPTER XXII

THE ROYAL AIR FORCE. HISTORICAL

THE ORIGINS OF FLYING

FROM the earliest times man has dreamed of the conquest of the air. There is the fable of Dædalus and Icarus from Greek mythology, and many of the early scientists designed various types of flying machines, but it is not until much nearer our own day that we have any definite evidence of actual attempts to fly. These attempts were usually made with the aid of devices attached to the arms and legs, with which the experimenters endeavoured to glide or fly after launching themselves from a high building. The result was invariably disaster, such as attended the Marquis de Bacqueville when he attempted to glide across the Seine in 1742, and who, after gliding some distance, fell on to a barge, breaking his leg in the fall.

But it was the Montgolfier brothers, with their invention of the hot-air balloon, who actually made the first flight possible. On November 21, 1783, Pilatre de Rozier, accompanied by the Marquis d'Arlandes, rose from the Bois de Boulogne and remained in the air for twenty minutes, during which they travelled some five miles.

The hot-air balloon, depending as it did for its lift on the heating of the air by a brazier suspended below the balloon, was an extremely dangerous contrivance, and it was almost immediately replaced by the hydrogen balloon. From then on ballooning became increasingly popular, but it was not until the development of the internal combustion engine that the navigable balloon, or dirigible, as it was then called, became a practical possibility.

Once the balloon had been developed, the next stage was the attempt to put it to some practical use, but the free balloon never did achieve very much. The French are said to have used a balloon at the battle of Fleurus in 1794, and they organised a balloon service during the siege of Paris in 1870. We ourselves first sent balloons on active service in 1884, when a balloon detachment accompanied an expedition to Bechuanaland. In fact, there was no fighting and the balloons were not used, but they did prove useful for reconnaissance during an expedition to the Sudan in the following year, 1885, and this is the first occasion on which the air was used by the British services in war. It was not until the 1914–18 war that the balloon came into its own, when, as the captive kite balloon, it was extensively used by the Army and Navy for reconnaissance, to reappear again in the last war as the familiar barrage balloon.

Although the French made some pioneer attempts to develop airships, they were outstripped by the Germans, and in 1900 Count Zeppelin produced his first large rigid airship. The career of the airship was punctuated by a series of major diasasters, and they eventually faded out in the 1930s, as the superiority of the aeroplane became more and more manifest, without ever having established themselves as a satisfactory means of transport. In this country the development of the airship was abandoned after the disaster to the R.101 in 1930, which crashed at Beauvais shortly after leaving Cardington on the first flight to India.

Parallel with the development of the balloon, experiments continued into the problem of mechanical flight. Cayley and Stringfellow were outstanding in their contribution to the solution of this problem, and Stringfellow as early as 1848 made a model aeroplane fitted with a light steam engine, which made several successful flights. But it was from the glider rather than from the early power-driven models, that the modern aeroplane was eventually evolved. Lilienthal in Germany and Pilcher in this country were the foremost in their experiments with gliders. Lilienthal in particular probably did more than any other pioneer to advance the study of gliding, and both he and Pilcher were eventually killed in gliders of their own design. Parallel with their experiments Langley was working in America on the production of a flying machine, and in 1896 he produced a steam-driven model which made many successful flights, one of them of three-quarters of a mile. But his attempts to produce a full-scale machine capable of carrying a man failed, and it was left to the brothers Wright to design the first successful flying machine.

After many experiments with gliders, they built a machine with an eight horse-power motor, and it was with this machine, on December 17, 1903, that the first flight was made by Orville Wright, of twelve seconds' duration. Only a handful of spectators were present to see this, and the three subsequent flights, that were made by the brothers on that momentous morning, the final one lasting for fifty-nine seconds. The era of the flying machine had arrived at last.

In Europe France led the way in the further development of aviation, and it was not until 1909 that the first flight was made by a British subject in the British Isles. It was thought at one time that the first flight had been made by Mr. A. V. Roe at Brooklands in 1908, but in 1929 a Committee set up by the Royal Aero Club decided that Lieutenant-Colonel Moore-Brabazon (now Lord Brabazon of Tara) had made the first flight at the Isle of Sheppey in a Voisin aeroplane in May 1909. On July 25 of the same year Bleriot flew the Channel, and from then on steady progress was made in this country, although little official encouragement was given to aviation in its early years.

FORMATION OF THE ROYAL AIR FORCE

Although balloons had been in use in the Army for some years previously, the first step which led eventually to the formation of the Royal Air Force dates from May 1890, when a Balloon Section of the Royal Engineers was formed. With the advent of the aeroplane, aviation became of increasing importance, and the Balloon Section was expanded into the Air Battalion in April 1911. Meanwhile the progress being made in various countries in Europe with military air services led to the appointment, in December 1911, of a sub-committee of the Committee of Imperial Defence to consider the setting up of an aviation service. This sub-committee recommended the formation of the Royal Flying Corps, with a naval and a military wing, and this came into existence on May 13, 1912.

The original intention was that the Royal Flying Corps should be an independent service, but this intention was never put into effect. The

Naval Wing practically from the first came directly under the Admiralty, and was called "The Royal Naval Air Service," although this title was not officially adopted until July 1, 1914. Following the severance of the Naval Wing the title of Military Wing was dropped, and the Royal Flying Corps, having become an exclusively military organisation, continued under the Army for the remainder of its existence.

The setting up of two separate air services did not stand the stress of war, and as the air arms grew in size and importance the machinery for controlling them creaked increasingly loudly. It was mainly the competition for aeronautical supplies that eventually led to a reorganisation. Various compromises were tried, such as the Joint War Air Committee, which was set up early in 1916 to co-ordinate questions of supply and design for the two services. This committee was not a success, and was replaced in May 1916 by the Air Board; but here again, as the Board was only advisory, the position remained unsatisfactory, and became worse as time went on. Matters were brought to a head by the successful daylight raiding of London on two occasions in June and July 1917, and following these attacks, General Smuts, after examining the air organisation on the instructions of the Prime Minister, recommended the setting up of an Air Ministry and the unification of the air services. These recommendations were agreed by the Government, and the Royal Air Force came into being on April 1, 1918, Lord Rothermere being the first Secretary of State and Major-General Sir H. M. Trenchard the first Chief of the Air Staff, on the Air Council, which became the controlling authority in the Air Ministry, on similar lines to the Army Council in the War Office.

THE 1914–18 WAR

In 1914, when the war started, less than eleven years had elapsed since the first flights of the Wright brothers, and flying was in its infancy. The strength of the Royal Flying Corps and Royal Naval Air Service combined was only 276 officers and 1,797 men, and they mustered about 100 aircraft between them; but by the time of the Armistice in 1918 the Royal Air Force had a strength of 27,333 officers and 263,837 men, and 22,647 aeroplanes and seaplanes, together with 103 airships. The shape of things to come was beginning to emerge and the future potentialities of air power to be visualised.

The air forces were employed, however, throughout the war almost entirely on operations in direct support of the Army and Navy. There was, though, one important exception, in that in May 1918 the Government decided to form an Independent Force to undertake a sustained bombing offensive against German munition industries. The title was perhaps somewhat ill chosen in the light of after events, and led to a lot of subsequent misunderstanding as to the role of bomber forces in war. This feeling was well expressed at the time by a French general, who is supposed to have said, "Independent of whom? Of God?" a remark which, in other terms, has often since been repeated. Strategic bombing, however, had come to stay, and the operations of the Independent Force provided an extremely accurate forecast of the bomber operations to be undertaken in the 1939–45 war. The operations of the force also provided an early example of the flexibility of air power, in that in September 1918 the Independent Force co-operated with the French and American Armies during their final offensive, bombing the German rail communications, in the same way that in 1944 and 1945 the strategic bomber aircraft were used to interrupt the German communications and to assist directly the advance of the British and American Armies.

BETWEEN THE WARS

By 1920 the demobilisation of the Royal Air Force had been completed and the post-war build-up begun, based on the organisation drawn up by the Chief of the Air Staff in 1919. Sir Hugh Trenchard (now Viscount Trenchard) had been re-appointed on January 1, 1919, and the Air Force was fortunate in having a man of his vision and personality at the helm during the supremely important formative years up to the end of 1929.

Under this organisation stress in the first instance was laid upon training, and only the minimum number of service squadrons required to meet our commitments were formed. The Air Estimates for 1920 provided for 28,280 officers and men and for 33 squadrons, of which only twelve were at home. There were two Commands in the United Kingdom: Coastal Area, which controlled all units working with the Navy; and Inland Area, which controlled all the other units at home.

This organisation continued in force until January 1, 1925, when the Air Defence of Great Britain was formed, and which comprised a Wessex Bombing Area and a Fighting Area. In the Air Estimates for that year it was stated that the intention was to build up a Home Defence Force of fifty-two squadrons during the next five years.

The principle of functional rather than geographical commands was, however, gradually evolving, and in July 1936 the Air Defence of Great Britain was disbanded and replaced by four functional commands, Bomber, Fighter, Coastal, and Training, all responsible directly to the Air Ministry. This principle has been followed ever since, and whenever possible Commands are organised on a functional basis. Overseas, where this principle cannot well be followed, because all the air forces in any particular theatre are usually under one air commander, the lower formations are, where practicable, organised functionally.

This reorganisation was brought about just in time to meet the needs of the Air Force expansion. The fifty-two squadron programme stood until 1934, but in 1932 Mr. Baldwin had said, "the bomber will always get through," and in 1934 he announced the principle of equality with any country within striking distance of our shores. A further expansion programme was then announced, but this was overtaken by events, and in May 1935 it was stated that the Royal Air Force at home would be raised to 1,500 aircraft by March 1937. On the outbreak of war the total strength of the Air Force was 2,600 aircraft, of which 1,930 were located in the United Kingdom, and 118,000 officers and men. When it is considered that the strength of the Air Force in 1935, the year in which expansion can be said properly to have commenced, was only 33,000, and that in 1944 when it reached its peak, the strength was about 1,200,000, some idea can be gained of the extent of the dilution of regular personnel which was necessary, and of the tremendous burden falling upon them.

Meanwhile the Air Force had been playing its part in numerous small wars, and in 1922 the air control policy came into being when, following the Cairo Conference in 1921, the Royal Air Force was entrusted with the defence of Iraq, or Mesopotamia as it was then called, and the army garrison was withdrawn. The air control policy led to much controversy, but nevertheless it proved an outstanding success in Iraq, and the cost to the taxpayer was far less than if a military garrison had been employed. During the earlier years in Iraq the Air Force had to deal on many occasions with the incursions of Sheikh Mahmud. This almost legendary figure, who aimed at setting up an independent Kurdish state, became widely known as the Director of Training of the Royal Air Force, in view of the large numbers of officers and men who, at various stages in their careers, were involved in his activities.

Following the success of the experiment in Iraq, air control was extended to Aden, the defence of which was taken over by the Royal Air Force in February 1928. Air control would appear to have been equally suitable for conditions on the North-West Frontier, but although it was often suggested, there was much opposition to the proposal, and the vested interests proved too strong. As a result air control was never adopted, even though it had proved successful during a trial in 1925, and the role of the Air Force in the many small campaigns in the region remained subordinate to that of the Army.

There was a considerable amount of controversy between the wars as to the control of the aircraft working with the Navy. On the formation of the Royal Air Force in 1918, all aircraft other than airships were taken over, and airships were transferred in 1919. This arrangement continued until 1924, when, after much discussion and considerable pressure from the Admiralty, the Fleet Air Arm was formed. The provision of aircraft and technical personnel and training remained the responsibility of the Royal Air Force, but the Navy provided the bulk of the flying personnel. The argument, however, still continued, and in 1937 the Fleet Air Arm was transferred completely to the control of the Admiralty. Later on, during World War II, Coastal Command, whilst remaining an Air Force formation, was placed under the operational control of the Admiralty.

When the expansion of the Air Force was planned in 1935, it became clear that a large reserve force would be required in the event of war, and the Royal Air Force Volunteer Reserve was formed on July 30, 1936. As the threat of war increased it was decided to supplement the available manpower by the recruitment of women, and the Women's Auxiliary Air Force was formed on June 28, 1939.

1939–45

September 3, 1939, found the Royal Air Force in the full swing of the expansion programme which had started in earnest in 1935. The strength in that year had been 33,000, and by the outbreak of war it had risen to 118,000 men and 2,600 aircraft. By D-Day in 1944, which was the peak personnel figure, it was 1,186,000 men and women, and the peak aircraft strength was 8,600 in April 1945. For the invasion of Europe there were some ten thousand aircraft located in the British Isles, of which just over half were American and the remainder British. Working with the Royal Air Force were many men from the Dominions, and notably from Canada, who provided a large proportion of the bomber element, together with many of our Allies.

But expansion was a slow and long-drawn-out process. The foundation had been laid before the war, with the setting up of the shadow factories, but it was a long time before these and the conversion of industry to war production began to bear fruit. Bomber production in particular lagged behind, and the 4,000-bomber programme had only reached about half that figure by the end of the war. With the many other calls upon industry the programme became incapable of achievement, and eventually had to be severely reduced.

In 1936, before the expansion programme was properly under way, less than 2,000 aircraft had been produced, but by 1939 the figure had risen to 8,000. In 1943–44, the peak year of the war, 27,000 new aircraft were produced, and in addition major repairs were carried out on 18,000 aircraft, whilst the industry employed almost 2,000,000 workers. The expansion rate was actually much greater than is shown by the number of aircraft produced, because of the great increase compared with pre-war in the size and carrying capacity of the aircraft. New production in 1943–44 was therefore roughly equivalent to ten to twelve times that of 1939.

Until the middle of 1940 aircraft production was in the hands of the Air Ministry, but the Battle of France and the possible invasion of the United Kingdom made aircraft production of overwhelming importance. The Ministry of Aircraft Production was therefore formed just in time to face the major task under its first Minister, Lord Beaverbrook, of giving the Royal Air Force the fighters required for the Battle of Britain, whilst the Air Ministry was left free to concentrate all its energies on fighting the war in the air.

Although the Royal Air Force fought on many fronts in almost every part of the world, such as the North African campaigns, the siege of Malta, and the invasion of Italy, the main part of the effort of the Air Force was concentrated in and around the United Kingdom. Operations fell into four main phases, although there was no clear-cut division between them, and all of them except the last continued in some degree throughout the war.

There was first of all the security of the home front, which reached its climax on September 15, 1940, during the Battle of Britain, when 183 German aircraft were reported as having been destroyed, although these figures were reduced after the war to 56. But even though the Battle of Britain was won, the country still had to endure the night bombing attacks. In the autumn of 1940 London was attacked for fifty-seven nights in succession, and attacks on the United Kingdom continued intermittently until the end of the war, terminating in the flying-bomb and rocket attacks.

Similarly with the Battle of the Atlantic. The Athenia was torpedoed on the evening of the day war was declared, and from then until the end of the war the battle waxed and waned, although the period of greatest danger was probably in 1941 and 1942.

Bomber Command's attacks on Germany did not start until the period of the "phoney war" came to an end, but from then on the weight of their offensive gradually mounted, and by the end of the war they had dropped 955,000 tons of bombs, of which 656,000 tons were dropped on Germany.

The strategic bombing policy led to much controversy as to the best category of target to attack. Even before the war it was evident that successful attacks on oil targets were likely to pay the best dividends of all, as the denial of oil to the enemy would almost certainly cause more widespread disruption than any other category of target. Oil targets were therefore attacked in 1940; but the limited weight of our effort, coupled with the difficulty of locating such targets, compelled us to switch over to area bombing, with the object of disrupting industrial production, in the middle of 1941. This policy continued until we were able to develop the navigational aids required for precision bombing, and in 1944 we reverted to the attack of oil targets; and in addition, as part of our plan for the invasion of the Continent, transportation targets were attacked. The attack of oil and transportation targets, together with the development of the so-called "round the clock" bombing, under which the American strategic bombers operated by day and our own bombers by night, meant that from the beginning of 1944 to the end of the war, Germany was subjected to unceasing attack from the air by day and by night. Even when, as happened on several occasions during and after the invasion of the Continent, the bombers had to be switched to targets in direct support of the operations of the Army, a substantial proportion of the force remained concentrated upon the strategic targets. This very ease with which the bombers were switched from one target to another at various stages in the war illustrates the danger, inherent in the flexibility of air power, of dissipating the available resources over a multiplicity of targets instead of concentrating upon those of vital importance.

The final phase was the development of direct air support for the Army during the invasion of Europe on an unprecedented scale. The African campaign in support of the Eighth Army had proved how essential it was for the Army to fight under the cover of air superiority, and the Tactical Air Forces had been gradually evolved from the old Army Co-operation squadrons. By D-Day not only were there several thousand aircraft located in the British Isles for the direct support of the American and British Armies, but in addition there were the aircraft of Fighter Command, and the strategic bombing aircraft of both countries were frequently employed in direct support of the land forces. Practically the whole of the ten thousand operational aircraft in the country were therefore available, and this overwhelming concentration of aircraft enabled almost complete air superiority to be maintained over the initial landing and throughout the advance into Germany.

THE POST-WAR YEARS

Partial demobilisation commenced immediately the war with Germany ended without waiting for the defeat of Japan, and progressed smoothly in accordance with the plans that had been prepared well in advance. Although the scheme itself was probably the best that could have been devised, and was eminently fair to the individual on the first-in, first-out principle, it did mean that the most experienced men were released first. As a result the Air Force, in common with the other services, has had the greatest difficulty in maintaining efficiency, owing to the serious shortage of experienced officers and men and the rapid turnover of the National Service intake.

In view of the great expansion in civil aviation that would occur following the end of the war, the Ministry of Civil Aviation was formed on April 25, 1945, and this responsibility was removed from the Air Ministry. When the time came to wind up the Ministry of Aircraft Production, it was decided to continue the war-time system whereby the Air Ministry was left free to concentrate upon operations, and aircraft production was transferred to the Ministry of Supply, where the responsibility still rests.

The original air estimates for each year since the war, exclusive of any supplementary estimates, were as follows:

Year	*Net Estimates*	*Maximum Personnel*
1946	£255,500,000	760,000
1947	£214,000,000	370,000
1948	£173,000,000	325,000
1949	£207,450,000	255,000
1950	£223,000,000	215,000

It will be noted that, although there has been a progressive reduction in the personnel, the tension of the international situation was reflected in a rise in the 1949 estimates of £34 million, which was almost entirely due to increased figures for aircraft, stores, and supplies, and a further rise in the 1950 estimates of another £16 million, which again represents mainly increased expenditure on aircraft and stores.

W. M. Yool

CHAPTER XXIII

THE ROYAL AIR FORCE. ORGANISATION AND ROLE

THE AIR COUNCIL AND THE AIR MINISTRY

THE AIR COUNCIL administers the Royal Air Force through the machinery of the Air Ministry, which derives its authority from Parliament.

The President of the Air Council is the Secretary of State for Air, and the administrative business of the Air Ministry is dealt with by five Departments, which are under four Air Members of the Council and the Permanent Under-Secretary of State for Air. The Vice-President of the Air Council is the Parliamentary Under-Secretary of State for Air, and there are three additional Air Members, the Vice-Chief of the Air Staff, the Deputy Chief of the Air Staff, and the Controller of Supplies (Air). There are therefore ten members in all, and the actual composition of the Air Council as at April 1, 1950, was:

Secretary of State for Air and President of the Air Council, The Rt. Hon. Arthur Henderson, K.C., M.P.

Parliamentary Under-Secretary of State for Air, and Vice President of the Air Council, Aidan Merivale Crawley, M.P.

Chief of the Air Staff, Air Chief Marshal Sir John C. Slessor, G.C.B., D.S.O., M.C.

Air Member for Personnel, Air Marshal Sir Leslie N. Hollinghurst, K.C.B., K.B.E., D.F.C.

Air Member for Supply and Organisation, Air Marshal Sir William F. Dickson, K.B.E., C.B., D.S.O., A.F.C.

Air Member for Technical Services, Air Marshal Sir R. Victor Goddard, K.C.B., C.B.E.

Vice-Chief of the Air Staff (Additional Member), Air Chief Marshal The Hon. Sir Ralph A. Cochrane, K.C.B., K.B.E., A.F.C., *A.D.C.*

Deputy Chief of the Air Staff (Additional Member), Air Marshal Sir Arthur P. M. Sanders, K.B.E., C.B.

Controller of Supplies (Air), Ministry of Supply (Additional Member), Air Marshal Sir W. Alec Coryton, K.C.B., K.B.E., M.V.O., D.F.C.

Permanent Under-Secretary of State for Air, Sir James H. Barnes, K.C.B., K.B.E.

The Controller of Supplies (Air) is an official of the Ministry of Supply, and serves as an Additional Member of the Air Council in order to provide a high-level connecting link between the two Ministries in regard to the operational requirements of the Royal Air Force.

An important change in the composition of the Air Council took place on March 1, 1950, when the Air Staff was reorganised into two main groups, one under the Vice-Chief of the Air Staff and the other under the Deputy Chief of the Air Staff, both of whom report direct to the Chief of the Air Staff, whereas under the previous organisation the Deputy Chief reported through the Vice-Chief. At the same time the Deputy Chief was made an Additional Member of the Air Council.

Under the new organisation the Vice-Chief is mainly responsible for matters affecting the development, training, and fighting efficiency of the Royal Air Force, whilst the Deputy Chief is responsible for operations, inter-service policy and planning, and for co-operation with the Commonwealth and Allied air forces.

The reasons which led to this reorganisation were threefold. There was firstly, the growing pressure of work arising from the various international commitments following on the new treaties, such as the North Atlantic Treaty and Western Union; secondly, the development and training problems created by the introduction of the latest types of aircraft; and thirdly, the need for economies in staff. A select committee on defence estimates reported in January 1950 that a simplification of the headquarters' organisation of the three services was necessary, and the reorganisation of the Air Staff is a step towards that end.

The control and administration of the Air Force is exercised mainly through the four Departments that are under Air Members of the Air Council, and instructions to Commands are normally issued by these Departments. The Department of the Permanent Under-Secretary of State for Air, in addition to providing the secretarial staff of the Air Ministry, deals mainly with financial matters and policy questions requiring reference to other Government Departments or authorities.

There is therefore an important difference between the staff organisation at the Air Ministry level and that at the Command and lower formation level. From Command level downwards the staff of the Air Force is organised into three divisions, the Air Staff, the Administrative Staff, and the Technical Staff, which is popularly known as the "three-pronged" organisation. The Administrative Staff at Command level and below has therefore to look for guidance and instructions to two Air Ministry Departments, namely those of Personnel and of Supply and Organisation.

INSPECTORATE-GENERAL OF THE ROYAL AIR FORCE

Location: 136 Richmond Hill, Richmond, Surrey.

Inspector-General: Air Marshal Sir Hugh W. L. Saunders, K.C.B., K.B.E., M.C., D.F.C., M.M.

Role: Undertakes visits and inspections, and investigates problems requiring special examination, on behalf of the Chief of the Air Staff. He is assisted by a small staff, including an Inspector of W.R.A.F.

COMMAND ORGANISATION

The Royal Air Force is organised in Commands, of which there are eight at home and three overseas. The home Commands are Bomber Command, Coastal Command, Fighter Command, Flying Training Command, Maintenance Command, Technical Training Command, Transport Command, and Reserve Command. The Overseas Commands are British Air Forces of Occupation, Germany, the Middle East Air Force, and the Far East Air Force. In addition No. 90 Group at Home and the Rhodesian Air Training Group have a status equivalent to that of a Command.

The Home Commands are organised on a functional basis and the Overseas Commands on a geographical basis, but if any material expansion should take place overseas at any time it is probable that the lower formations would be organised on a functional basis, as this system is essential for full operational efficiency and is only departed from for reasons of economy.

The Commands are organised in Groups (or overseas, more usually, Air Headquarters), and the Groups are organised in Stations on which the squadrons or other units are located.

The staffs of the Commands and Groups are, as mentioned above, organised in three branches, Air, Administrative, and Technical. The Air Force staff used to be organised on the Army system of two branches, but the experience of the war showed the advisability of separating the Technical Branch from the Administrative Branch in view of the great importance to the operations of the Air Force of an efficient system of technical maintenance. The organisation is, in fact, analogous in some respects to the system whereby responsibility for aircraft production was transferred during the war to the Ministry of Aircraft Production and subsequently to the Ministry of Supply when the former Ministry was wound up at the end of the war.

The head of each Branch of the Staff of a Command or Group reports direct to the Commander, not, as is the practice in some other services, through a Chief of Staff.

BOMBER COMMAND

Location: High Wycombe, Buckinghamshire.

Air Officer Commanding-in-Chief: Air Marshal Sir Hugh P. Lloyd, K.B.E., C.B., M.C., D.F.C.

Lower Formations: No. 1 Group, Bawtry, Doncaster, Yorkshire.
No. 3 Group, Mildenhall, Bury St. Edmunds, Suffolk.

Aircraft: 'Lancaster' B.1 and B.7, 'Lincoln' B.2, 'Mosquito.' B.35 and T.2, B.29.

Role: Bomber Command is the main striking arm of the Air Force, and as at present equipped is intended to operate mainly by night, the aircraft flying unescorted and relying for defence upon their defensive armament and evasion. It has been announced, however, that the Air Force is being equipped with a number of American B.29 strategic bombers, under the Military Assistance Programme, and when this occurs Bomber Command may operate these aircraft by day, as does the United States Air Force. But the Americans rely on the support of a long-range fighter escort, a type of aircraft that we cannot produce in large numbers, because of the necessity of concentrating our fighter production in the main on the Home Defence fighter, in which speed and climb take precedence over range, and the lack of long-range fighters may therefore affect the tactical use of the B.29 aircraft.

COASTAL COMMAND

Location: Northwood, Middlesex.

Air Officer Commanding-in-Chief: Air Marshal C. R. Steele, C.B., D.F.C.

Lower Formations: No. 18 Group, Pitreavie Castle, Dunfermline, Fife.
No. 19 Group, Mount Batten, Plymouth, Devonshire.
R.A.F., Gibraltar.

Aircraft: 'Anson' 19, 'Dakota' C.4, 'Halifax' (Met.) 6, 'Lancaster' GR.3 and PR.1, 'Mosquito' PR.34, 'Spitfire' PR.19, 'Sunderland' GR.5.

Role: Coastal Command is responsible for the provision of aircraft for maritime operations, which are operated, in accordance with naval requirements, through Joint Headquarters located with each lower formation and the corresponding Naval Command.

FIGHTER COMMAND

Location: Bentley Priory, Stanmore, Middlesex.

Air Officer Commanding-in-Chief: Air Marshal Sir Basil E. Embry, K.B.E., C.B., D.S.O., D.F.C., A.F.C.

Lower Formations: No. 11 Group, Hillingdon, Middlesex.
No. 12 Group, Newton, Nottinghamshire.

Aircraft: 'Vampire' F.1, F.3, and FB.5, 'Meteor' F.3 and F.4, 'Hornet F.3, 'Mosquito' NF.36, 'Spitfire' FR.14, LF.16 and 21, and F.22, 'Auster' 6.

Role: Fighter Command is responsible for the defence of the United Kingdom from air attack. To assist in this task the anti-aircraft forces allocated to Home Defence, under Anti-Aircraft Command, are under the operational control of Fighter Command, which also controls the Royal Observer Corps. Any balloon barrages which might be provided would also be under the Command, so that all the elements of the air defence system are co-ordinated under one head.

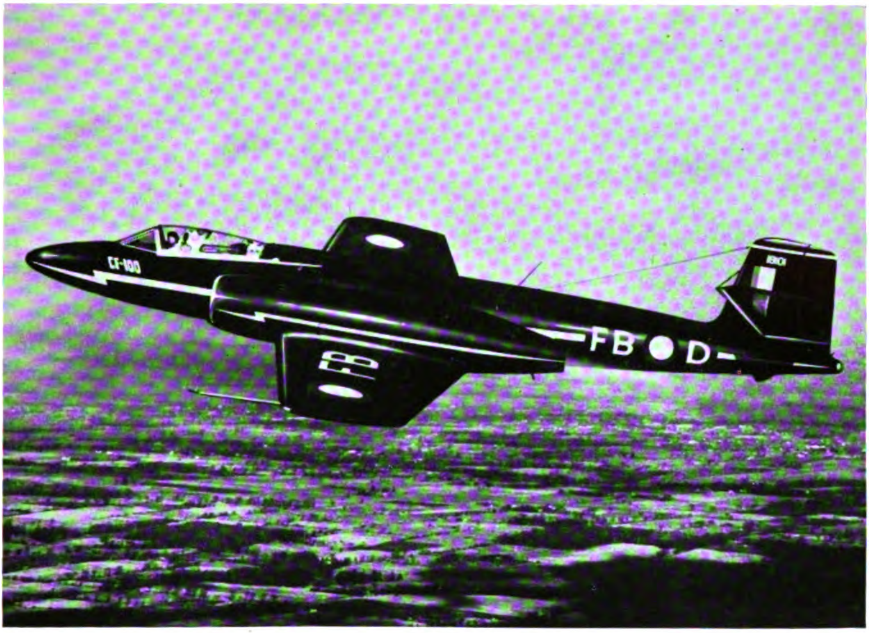
On November 1, 1949, the twenty fighter squadrons of the Royal Auxiliary Air Force were transferred to Fighter Command. Since the squadrons were re-formed in 1946, they have been in Reserve Command, but having now reached a sufficiently high standard of training they have been transferred to the Command under which they would operate in war.

Fighter Command is also responsible for the training of certain squadrons in the role of tactical co-operation with the Army, and administers the Air Observation Post squadrons which are under the operational control of the Army.

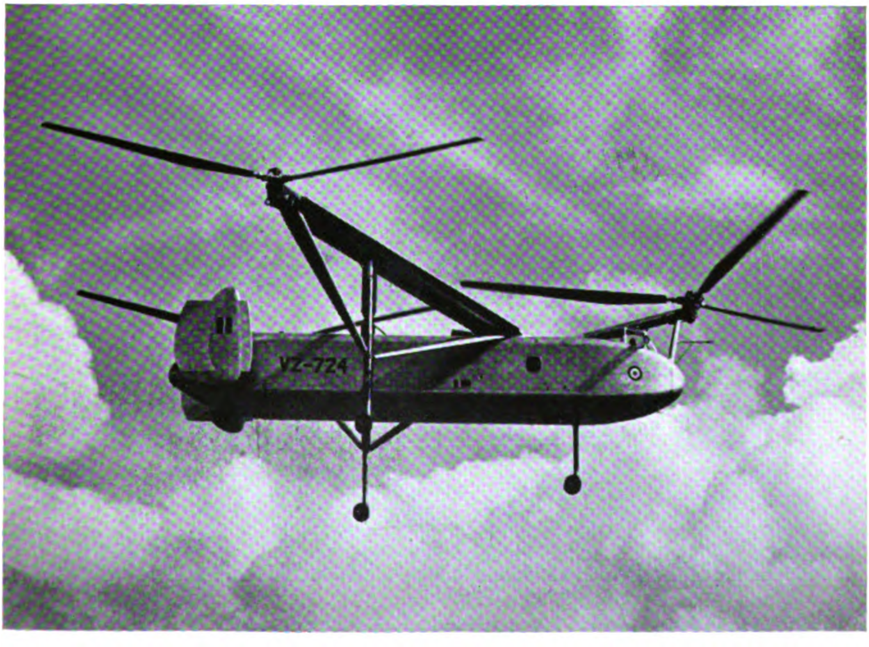
FLYING TRAINING COMMAND

Location: Shinfield Park, Reading, Berkshire.

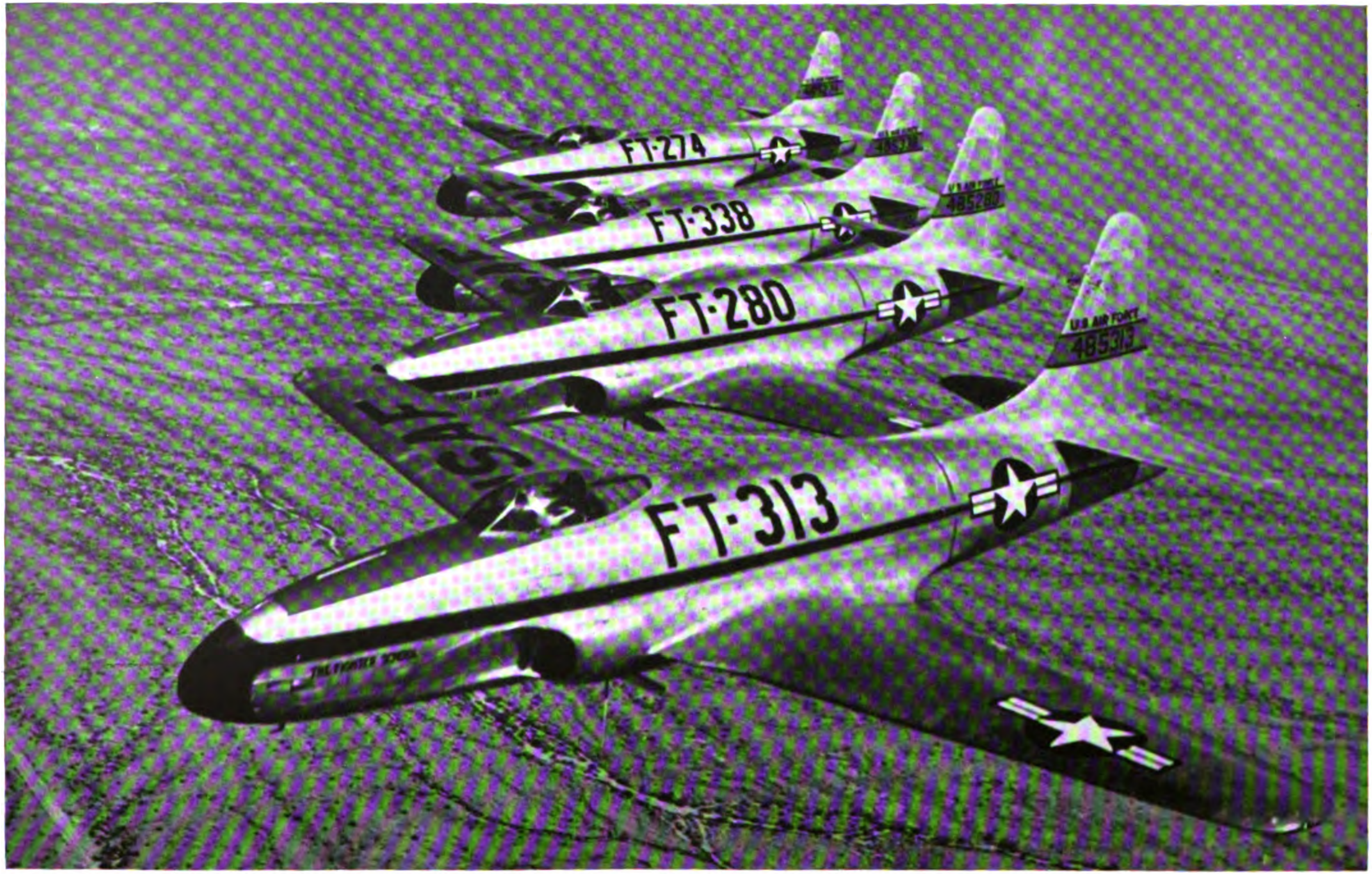
Air Officer Commanding-in-Chief: Air Marshal Sir Hugh S. P. Walmsley, K.C.I.E., C.B., C.B.E., M.C., D.F.C.



Avro Canada C.F.100



Cierva Airhorse



Lockheed F-80 Shooting Star jet fighters of the U.S.A.F.

Lower Formations: No. 21 Group, Morton Hall, Swinderby, Lincolnshire.
No. 23 Group, Leighton Buzzard, Bedfordshire.
Royal Air Force College, Cranwell.
Royal Air Force Flying College, Manby, Lincolnshire.

Aircraft: Percival 'Prentice' T.1 (basic training), North American 'Harvard' 2.B, 'Varsity' T.Mk.1, and 'Balliol' (applied training), 'Meteor' and 'Vampire' (advanced training).

Role: The Command is responsible for flying training from the basic flying stage up to the flying and handling stage on operational types of aircraft. Operational and tactical training in the use of the aircraft is given in the operational Commands at the Operational Conversion Units. The Command is also responsible for air navigation and air armament training, and for the supervision of the Rhodesian Air Training Group.

The Royal Air Force College, Cranwell, is the training centre for the regular officers of the Air Force, who enter the College as Cadets.

The Royal Air Force Flying College was formed in January 1950 by the amalgamation of the three Empire Schools for Flying, Air Navigation, and Air Armament, and is intended to give practical instruction and experience in a combined course of flying, navigation, and the use of weapons in all-weather conditions. In order to retain the Empire outlook of the three former schools, the Commonwealth will be represented on the instructing staff and on the courses.

MAINTENANCE COMMAND

Location: Amport, Andover, Hampshire.

Air Officer Commanding-in-Chief: Air Marshal T. A. Warne-Browne, C.B., C.B.E., D.S.C.

Lower Formations: No. 40 Group, Bicester, Oxfordshire.
No. 41 Group, Andover, Hampshire.
No. 42 Group, Kidlington, Oxfordshire.
No. 43 Group, Hucknall, Nottinghamshire.

Role: Maintenance Command is responsible for the storage and issue to units at home and to depots overseas of aircraft, stores, equipment, and explosives, and for major repairs to aircraft and motor transport. The Command is also responsible for the administration of the experimental stations that, though manned by the Air Force, are under the technical direction of the Ministry of Supply.

TECHNICAL TRAINING COMMAND

Location: Brampton, Huntingdonshire.

Air Officer Commanding-in-Chief: Air Marshal Sir John W. Jones, K.C.B., C.B.E.

Lower Formations: No. 22 Group, Market Drayton, Shropshire.
No. 24 Group, Aston Clinton, Aylesbury, Buckinghamshire.
No. 27 Group, Colerne, Chippenham, Wiltshire.
Royal Air Force Technical College, Henlow.

Role: The Command is responsible for all forms of training in ground duties for officers and airmen, including the initial training of recruits, technical training, and the training of apprentices. The Royal Air Force Technical College is intended to give higher technical training, and its work corresponds on the technical side to that of the Royal Air Force Flying College on the flying side.

TRANSPORT COMMAND

Location: Bushy Park, Teddington, Middlesex.

Air Officer Commanding-in-Chief: Air Marshal Sir Aubrey B. Ellwood, K.C.B., D.S.C.

Lower Formation: No. 38 Group, Upavon, Marlborough, Wiltshire.

Aircraft: 'York' C.1, 'Dakota' C.4, 'Hastings' C.1.

Gliders: Airspeed 'Horsa' and G.A. 'Hamilcar.'

Role: Transport Command is responsible for the operation of all transport services for the Air Force in the United Kingdom and Europe and on all long-distance routes between the United Kingdom and the overseas Commands. Transport services within the overseas Commands are the responsibility of the Command concerned. Transport Command is also responsible, in co-operation with the Army, for the training of the airborne forces in the air aspects of their work.

During the greater part of 1949 up to September 23 a large part of the resources of the Command was engaged on the Berlin airlift, known as "Operation Plainfare."

It was announced in February 1950 by the Government that, as part of the economies being effected in the Services, there was to be a cut in aircraft production, and that in the main this would affect the supply of transport aircraft, notably the Hastings and Valetta, so as to interfere as little as possible with the operational Commands. This means that the operations of Transport Command will probably have to be curtailed as new aircraft in sufficient numbers will not be available for replacement.

RESERVE COMMAND

Location: White Waltham, Maidenhead, Berkshire.

Air Officer Commanding-in-Chief: Air Marshal R. M. Foster, C.B., C.B.E., D.F.C.

Lower Formations: No. 61 Group, Kenley, Whyteleafe, Surrey.
No. 62 Group, Rudloe Manor, Chippenham, Wiltshire.
No. 63 Group, Hawarden, Chester.
No. 64 Group, Heslington, Yorkshire.
No. 65 Group, The Hyde, Hendon, London.
No. 66 Group, Turnhouse, Edinburgh.

Aircraft: 'Tiger Moth' (Reserve Schools Trainer), 'Anson' 21, 'Auster' 6.

Role: Reserve Command is responsible for the training and administration of the reserve and auxiliary forces, other than the fighter squadrons of the Auxiliary Air Force that have been transferred to Fighter Command, and of the Air Training Corps. It also administers the University Squadrons. The Command is also responsible for recruiting for all the reserve forces and for all dealings with the Territorial and Auxiliary Forces Associations. To this end it is organised in six Groups covering the whole of the United Kingdom.

NO. 90 GROUP

Location: Medmenham, Marlow, Buckinghamshire.

Air Officer Commanding: Air Vice-Marshal R. G. Hart, C.B., C.B.E., M.C., A.R.C.S.

Role: As the greater part of the signals services in the United Kingdom are necessarily common to all Commands, the Group is responsible for providing such services, and is controlled and administered directly by the Air Ministry. It has therefore a status similar to that of a Command.

BRITISH AIR FORCES OF OCCUPATION, GERMANY

Commander-in-Chief: Air Marshal T. M. Williams, C.B., O.B.E., M.C., D.F.C.

Lower Formations: Nos. 2 and 85 Groups, the former being the operational and the latter the maintenance Group.

Aircraft: 'Auster' 6, 'Mosquito' B.35 and FB.6, 'Spitfire' FR.14 and PR.19, 'Vampire' FB.5.

Role: As part of the Allied forces of occupation, B.A.F.O. provides the tactical air forces for co-operation with the British and Western European Armies.

MIDDLE EAST AIR FORCE

Location: Ismailia, Egypt.

Commander-in-Chief: Air Marshal Sir John W. Baker, K.C.B., M.C., D.F.C.

Lower Formations: No. 205 Group, Fayid, Egypt.
Air Headquarters, Malta.
Air Headquarters, East Africa.
Air Headquarters, Iraq.
H.Q., British Forces, Aden.

Aircraft: 'Vampire' F.3 and FB.5, 'Tempest' 6, 'Spitfire' FR.18, 'Brigand' B.1, 'Mosquito' NF.36 and PR.34, 'Auster' 6, 'Dakota' C.4, 'Valetta' C.1. 'Lancaster' GR.3.

Role: The Command, in conjunction with the other services, is responsible for the defence of British interests throughout the area, which extends from Gibraltar to the Persian Gulf and from Greece to East Africa. Included in the Command is Aden, where air control, first applied in 1928, is still in operation, and Iraq, where air control was first tried out, but is no longer operative, as under the present Treaty with Iraq we are no longer responsible for the internal security of the country. We have, however, the right to maintain air bases at Habbaniyah and Sharjah, near Basrah, and this right is an important element in our Middle East strategy and strategic air routes.

Aden and Iraq are different in another respect from all other Commands and Formations, in that the Air Force Commanders in both places exercise command over any Army troops which may be located there, instead of having the joint system of command which is customary elsewhere.

FAR EAST AIR FORCE

Location: Changi, Singapore.

Commander-in-Chief: Air Marshal F. J. Fogarty, C.B., D.F.C., A.F.C.

Lower Formations: Air Headquarters, Ceylon.
Air Headquarters, Malaya.
Air Headquarters, Hong Kong.

Aircraft: 'Auster' 6, 'Brigand' B.1 and Met.3, 'Dakota' C.4, 'Mosquito' PR.34, 'Spitfire' F.18, FR.18, and F.24, 'Sunderland' GR.5, 'Tempest' F.2.

Role: The Command, in conjunction with the other services, is responsible for the defence of British interests throughout the area, which extends from Ceylon to Hong Kong. For some time past the air forces in Malaya have been actively engaged in the war in Malaya, in co-operation with the Army and Police. The Air Force is used mainly for reconnaissance and to provide striking forces on call, when suitable targets have been located by the ground forces. In Hong Kong the Air Force is playing its part in the stiffening of the defences of the area, in case Communist aggression should develop from the mainland.

RHODESIAN AIR TRAINING GROUP

The Group, which has its Headquarters at Bulawayo, Southern Rhodesia, and which is manned partly by the Rhodesian Air Force, is engaged on flying training under the supervision of Flying Training Command. This training is a continuation of the Empire flying training scheme, that proved so successful during the war, and enables the facilities developed then in Rhodesia to be retained in use. The Group is equipped with 'Anson' 20, 'Harvard' 2A/3, and 'Tiger Moth.'

AIR FORCES, WESTERN EUROPE

Location: Fontainebleau, France.

Commander-in-Chief: Air Chief Marshal Sir James M. Robb, K.C.B., K.B.E., D.S.O., D.F.C., A.F.C.

Role: The Commander-in-Chief, Air Forces, Western Europe, is responsible, through the Commanders-in-Chief Committee, for the planning and co-ordination of the air defences of the Western European countries. In war he would assume command of all air forces placed at the disposal of the Supreme Commander, and also of the air forces allotted to the territorial defence of North-East France and Benelux. This organisation is necessary because the areas of operations of the Tactical Air Forces and the Air Defence Forces are likely to over-lap, and it is therefore essential to have centralised control.

ROYAL AUXILIARY AIR FORCE

Reserve Command is responsible for the training and administration of all the R.A.A.F. units other than the fighter squadrons that have been transferred to Fighter Command, and for recruiting for all units. The R.A.A.F. consists of a number of Reserve Training Centres and Flying Schools, five A.O.P. squadrons, several light anti-aircraft squadrons as a reserve for the R.A.F. Regiment, and certain other small units.

UNIVERSITY AIR SQUADRONS

The squadrons, which are administered by Reserve Command, are intended to stimulate interest in the Royal Air Force at the Universities, and provide a channel whereby graduates are subsequently recruited. Squadrons have been formed at the following Universities:

Aberdeen.
Birmingham.
Cambridge.
Durham.
Edinburgh.
Glasgow.
Leeds.
London.
Manchester.
Nottingham.
Queen's, Belfast.
Oxford
Southampton.
St. Andrews.

ROYAL AIR FORCE REGIMENT

The Regiment was formed in February 1942, as the experience of the early part of the war had shown the need for the efficient local defence of airfields, especially in a war of movement. The responsibility had hitherto been divided between the Army and the Air Force, but this system had proved unsatisfactory.

After the war an enquiry was held into the future of the Regiment, and it was decided to continue it in being. The Regiment includes rifle and L.A.A. squadrons for the local defence of airfields, and armoured car squadrons in the Middle East Air Force and British Air Forces of Occupation, Germany. It is also responsible for the ground combat training of the Royal Air Force as a whole, and for the provision of officers and N.C.Os. for locally raised forces in Iraq, Aden, Malaya, and elsewhere if required.

In June 1948, in order to raise the status of the aircrafthands who have no technical trade but are mainly employed as orderlies, they were transferred to the Regiment under a scheme known as the Orderly Scheme. They are trained in ground combat duties; this will ensure that in war a nucleus of such specially trained airmen will be available in each unit.

WOMEN'S ROYAL AIR FORCE

Director: Air Commandant *Dame* Felicity Hanbury, D.B.E., A.D.C.

The Women's Royal Air Force was formed on February 1, 1949, and replaced the former Women's Auxiliary Air Force. It is no longer an auxiliary force, and is regarded as being an integral part of the Royal Air

Force. As such it provides women as substitutes for men in certain trades and duties.

ROYAL OBSERVER CORPS

Commandant: Air Commodore R. B. Jordan, C.B., D.F.C., A.D.C.

Role: The Corps is a civil volunteer force, administered by the Air Ministry and controlled operationally by Fighter Command, whose function it is to keep track of every hostile aircraft flying over Great Britain.

The Corps has a nucleus of permanent officers, and the present strength is about 15,000. The aim is to enrol 28,000 men and women between 16 and 55.

Regular training programmes are carried out with the Royal Air Force, and a special exercise was held on April 16, 1950, at the end of a week during which the Silver Jubilee of the Corps was celebrated.

AIR TRAINING CORPS

The Corps is administered by Reserve Command, and trains boys of 15–18 who wish to join the Royal Air Force or Naval Aviation for either air crew or ground duties.

A scheme is being introduced by the Air Ministry under which £30,000 a year is provided to train selected Air Training Corps cadets at civil flying clubs up to the private pilot's licence standard. The purpose of the scheme is threefold: to assist recruiting for the Royal Air Force, to encourage potential pilots to join the Air Training Corps, and to give financial help to the flying club movement.

W. M. Yool

CHAPTER XXIV

TRAINING IN THE R.A.F.

SINCE THE war the Royal Air Force has undergone considerable reorganisation. New branches have been formed and there is now a total of 15 branches, comprising: General Duties (Flying), Technical, Equipment, Secretarial, Royal Air Force Regiment, Marine, Airfield Construction, Medical, Dental, Chaplains, Legal, Education. Provost, Catering, and Physical Fitness Branches. Broadly, however, training in the Royal Air Force falls into three categories: flying training, technical training, and non-technical training. The policy governing each type of training is formulated at the Air Ministry and its implementation deputed to two main commands, Flying Training Command and Technical Training Command. Reserve training is deputed to Reserve Command and is described later. Flying Training Command is responsible for all flying training before the operational flying training stage; Technical training Command is responsible for all technical and non-technical training. The output of these two main commands provides the training support to the operational commands, both in the U.K. and overseas. To aid them in this task these Commands depute responsibility for certain aspects of training to Groups, which in turn further decentralise the detailed training to Stations and in some cases individual Schools. Flying Training Command controls two Flying Training Groups, together with the Royal Air Force College at Cranwell and the Royal Air Force Flying College at Manby. Technical Training Command controls three Technical Training Groups and also the R.A.F. Technical College at Henlow, with its Armament, Engineering, and Signals Divisions.

FLYING TRAINING COMMAND

Flying Training Command undertakes the flying training of pilots, navigators, signallers, and gunners before their operational training begins. Candidates for training in the General Duties (Flying) Branch consist of: (*a*) R.A.F. cadets taking up a cadetship at the R.A.F. College, Cranwell; (*b*) university entrants; (*c*) Regular airmen; (*d*) National service airmen; and (*e*) volunteers direct from civil life. They are required, apart from possessing certain educational attainments, to pass a R.A.F. medical board, flying aptitude tests, and a selection board before being accepted for training. Once accepted the Cranwell cadet is sent to the Royal Air Force College to begin his training.

R.A.F. COLLEGE, CRANWELL

The Royal Air Force was created by the amalgamation of the Royal Flying Corps and the Royal Naval Air Service on April 1, 1918. In 1919 a committee under the chairmanship of Lord Hugh Cecil recommended to the Air Ministry that steps be taken to consolidate the status of the Royal Air Force as a separate service. As a result of these recommendations, the Air Ministry decided to establish at Cranwell a cadet college, on the lines of Sandhurst and Woolwich, to train officers for permanent service in the Royal Air Force in an Air Force atmosphere and background. The Chief of Air Staff (at that time Air Marshal Sir Hugh Trenchard, Bart.) opened the College on February 5, 1920. In his opening speech Viscount Trenchard said:

> This College will have the making or marring of the future of a Service which was built up during the war by gallant pilots, observers, and other ranks who fought through it, and won a name in the air second to none in the world.
>
> If it is to continue its great work, which I am convinced that it will do, we realize that it has to live up to its war reputation, and we must ensure by every means that it does so.
>
> Therefore, you will have to work your hardest, both as cadets at the College and subsequently as officers, in order to be capable of guiding this Service through its early days and maintaining its traditions and efficiency in the years to come.

The first course at Cranwell was composed of 52 cadets, of whom 2 were sub-lieutenants and 17 were midshipmen transferred from the Navy, the remainder being public-school men. A pioneer airman, Air Commodore C. A. H. Longcroft, was appointed at the first Commandant of the College. During the period between the wars officers of the College played a distinguished part in the activities of the Royal Air Force. In the thirtieth anniversary of its foundation the College can look back with justifiable pride on a record of achievement by graduates of the College, who obtained numerous decorations for gallantry and many reached responsible positions of command prior to and during the 1939–45 war. The success of Cranwell is due in no small measure to the wisdom and far-sightedness of Marshal of the Royal Air Force Viscount Trenchard, who was so intimately connected with the foundation of the College.

On establishment, entries to the College were half-yearly and consisted of 30 cadets. Airmen apprentices from the technical schools were awarded cadetships in each entry. The cadet entry to the College remained numerically the same until 1938, when the cadet entry was increased by 50 per cent. for the year and the total intake spread over three entries. The syllabus of instruction allowed for a two-year course at the College, consisting of approximately 200 hours' flying, together with instruction in Imperial and War studies, English, Aeronautical Science and Engineering, General Service subjects, Drill and Physical Training, Aviation and Aeronautics, Airmanship and Applied Flying and Air Navigation, etc. The College was closed down on the outbreak of war in 1939. It re-opened in 1946.

The College is under the control of Flying Training Command, is commanded by a Commandant, and is directly controlled by an Assistant Commandant who is assisted by a staff of serving officers. A Director of Studies, assisted by an educational staff, is responsible for educational training.

The organisation comprises a college headquarters, an aircrew squadron (airmen), and a cadet wing (cadet officers), composed of three cadet squadrons. The Equipment and Secretarial Wing of the College is located at Digby, Lincs.

General Duties Branch Cadets now complete a total length of course of 2 years and 8 months, made up of three terms a year and eight terms in all. The first two terms consist of initial service and educational training under airman conditions of service at the apprentice wing of the R.A.F. Station, Cranwell. Basic and applied service and educational training continue for the remaining six terms at the College itself under officer cadet conditions of service. On graduation, cadets have reached the standard of the second year's work for a university pass degree; are qualified as pilots and in navigation. They have gained an adequate understanding of the duties of the other categories of aircrew and of the functions of all types of squadrons, and are ready to go through advanced flying school and operational training to fit them for the role of pilots in first-line operational squadrons.

Cadets for the Equipment and Secretarial Branches are trained at the Equipment and Secretarial Wing of the R.A.F. College at Digby. The total course length is 1 year 7 months, made up of three terms a year and five terms in all. The first two terms' training is carried out under airman conditions of service and the balance of training in the status of officer cadets. General service and officer training is combined with educational training and training in the work of the Equipment and Secretarial branch as appropriate.

Cadets for permanent commissions in the Royal Air Force Regiment first undergo a course of 4–6 months' general service and gunner training at the R.A.F. Regiment Central School, Catterick. By arrangements with the War Office, they then undergo a period of 18 months' training as officer cadets at the Royal Military Academy, Sandhurst. The course of training at the Academy is designed to fit the cadet for the arm in which he is to be commissioned, with a properly balanced educational background which includes a sound knowledge of world affairs. The syllabus includes, in addition to general service and officer training, the study of Modern History, Economics, English, Modern Languages, Imperial Affairs, Science, Physical Fitness, etc.

Admission to cadetships in the General Duties (Flying), Equipment and Secretarial branches and the Royal Air Force Regiment is granted to:

(*a*) successful competitors in the Royal Air Force Entrance Examination who also successfully complete the selection tests.

(*b*) "higher school certificate" candidates who are educationally qualified without written examination provided they successfully complete the selection tests.

(*c*) present and former Air Training Corps cadets provided they are educationally qualified, possess the A.T.C. proficiency certificate, and successfully complete the selection tests.

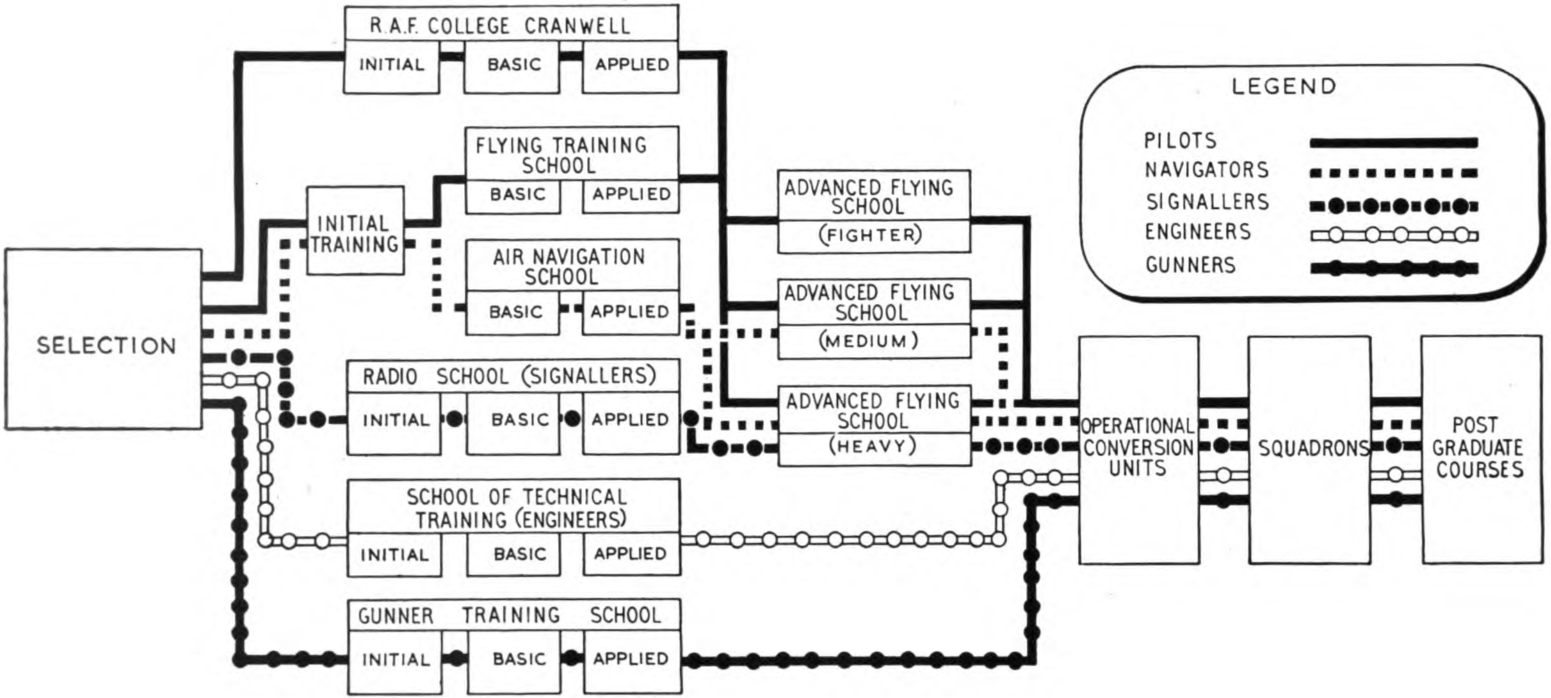
(*d*) aircraft and administrative apprentices selected on completion of apprentice training by the Air Ministry.

(*e*) serving airmen (included those called up under the National Service Acts) selected by the Air Ministry for cadetships.

FLYING TRAINING

All non-Cranwell entrants accepted for training in the General Duties (Flying) Branch are drafted to their respective Initial Training Schools as the first step in their training. The diagram, facing this page, shows the progress of training in diagrammatic form of all categories of trainee from this stage onwards. Pilots and navigators are trained in a joint Initial Training School, while signallers and gunners carry out their initial training in separate Initial Training Schools. The pattern of training up to flying badge standard for each category of trainee follows three similar stages, Initial Training, Basic Training, and Applied Training. Initial Training consists of Disciplinary Training, General Service Training, and a grounding in the respective specialised training. Basic Training consists of learning the principles of pilotage, navigation, signalling, or gunnery respectively, while Applied Training involves the application of the principles already learned on more advanced aircraft and under all conditions of flight. Flying Training Schools for the various categories of trainee are located in the United Kingdom, with the exception of those in Rhodesia, where pilots and navigators only are trained. Subject to satisfactory completion of these three stages of training the trainee is at this stage awarded his flying badge and, depending on his individual characteristics and capabilities, is selected for training at one of the Advanced Flying Schools. It is at the Advanced Flying School that the pilot, navigator, and signaller graduate to more advanced training to learn mastery of their advanced aircraft and associated equipment and where specialised training begins. The Advanced Flying Schools are divided into three categories: Heavy A.F.S., Medium A.F.S., and Fighter A.F.S. Pilots, navigators, and signallers who are posted to a Heavy A.F.S. will eventually be employed, after further training, in operational commands equipped with multi-engined aircraft, both landplane and seaplane. Pilots and navigators posted to a Medium A.F.S. will find operational employment in medium-bomber or night-fighter squadrons; while the pilot posted to a Fighter A.F.S. will eventually be employed in the short-or long-range fighter squadrons either in Fighter Command in the United Kingdom or in one of the Commands overseas.

The trainee on completing his training at an Advanced Flying School will have achieved a mastery of the aircraft or equipment that he is required to operate and is expected to be proficient in all techniques pertaining to them. His flying training in the air and ground instruction in the classroom have been carefully integrated to ensure that he understands fully the reasons for his actions and the principles which govern them while in the air. His instructors have laboured to ensure that throughout his Service career he will be able to draw upon the experience and knowledge inculcated during his period of flying training. His training is as yet, however, by no means complete; he must learn to operate his aircraft and equipment in a manner required by current tactics and to operate as a member of a tactical team in formation or as captain or member of a crew. For this further training the Operational Conversion Units, equipped with front-line aircraft and under the control of the main operational commands, take over from Flying Training Command the pilots, navigators, signallers, and gunners, and from Technical Training Command the flight-engineers, and embark on their tactical training, which results, for example, in their being welded into a crew fit to take its place in a front-line squadron in bomber, coastal, or transport operations, or a pilot who is capable of carrying out a high-speed interception at altitude in a modern jet fighter and


SELECTION
R.A.F. COLLEGE CRANWELL
INITIAL
BASIC
APPLIED
INITIAL TRAINING
FLYING TRAINING SCHOOL
BASIC
APPLIED
AIR NAVIGATION SCHOOL
BASIC
APPLIED
RADIO SCHOOL (SIGNALLERS)
INITIAL
BASIC
APPLIED
SCHOOL OF TECHNICAL TRAINING (ENGINEERS)
INITIAL
BASIC
APPLIED
GUNNER TRAINING SCHOOL
INITIAL
BASIC
APPLIED
ADVANCED FLYING SCHOOL
(FIGHTER)
ADVANCED FLYING SCHOOL
(MEDIUM)
ADVANCED FLYING SCHOOL
(HEAVY)
OPERATIONAL CONVERSION UNITS
SQUADRONS
POST GRADUATE COURSES
LEGEND
PILOTS
NAVIGATORS
SIGNALLERS
ENGINEERS
GUNNERS

destroying his target under all conditions. The Operational Conversion Units in the Royal Air Force are currently functionally divided as follows:

(*a*) Day-fighter and Fighter Reconnaissance O.C.U. (Fighter Command).
(*b*) Air Observation Post O.C.U. (Fighter Command.)
(*c*) Night-fighter and Tactical Light Bomber (Night) O.C.U. (Fighter Command).
(*d*) Heavy-bomber O.C.U. (Bomber Command).
(*e*) Light-bomber (Strategical) O.C.U. (Bomber Command).
(*f*) Light-bomber (Tactical Day) O.C.U. (British Air Forces of Occupation).
(*g*) Flying-boat O.C.U. (Coastal Command).
(*h*) Long-range General Reconnaissance O.C.U. (Coastal Command).
(*j*) Photographic Reconnaissance O.C.U. (Coastal Command).
(*k*) Medium-range Transport Conversion O.C.U. (Transport Command).
(*l*) Long-range Transport Conversion O.C.U. (Transport Command).
(*m*) Medium-range Transport Support O.C.U. (Transport Command).

The flow of trained pilots and crews from these Operational Conversion Units to the respective operational commands provides relief for those pilots and crews who are posted from the squadrons on completion of their tour of duty to post-graduate courses in instructional or staff duties.

CENTRAL SCHOOLS

The maintenance of a high standard of instruction in all types of flying training and the provision of skilled and competent instructors demand that adequate instructor training is available. To meet this need Flying Training Command has established the Central Flying School to train flying instructors, the Central Navigation School to train navigation instructors, and the Central Gunnery School to provide both fixed and free gunnery instructors. Potential instructors are selected from among suitably experienced squadron personnel for instructor courses at the respective Instructor Training Schools, and on completion of the course are posted to the training organisation to pass on to their pupils a high standard of achievement through personal example and sound instruction.

R.A.F. FLYING COLLEGE

Similarly, the Air Council recently reviewed the functions of the Empire Flying School, the Empire Air Navigation School, and the Empire Air Armament School with a view to integrating more closely their studies and teaching. As a result, it was decided to discontinue these Empire Schools with effect from August 1, 1949, and to combine certain aspects of their work in a new establishment to be known as the "Royal Air Force Flying College" under Flying Training Command.

The fighting efficiency of the Royal Air Force derives in special measure from the personal skill, knowledge, and experience of those who command flying units or who are concerned with the operation of aircraft. The R.A.F. Flying College was therefore formed to give selected officers practical instruction and experience in weapon employment, navigation, and flying, so that in their subsequent appointments they would be able, by their own knowledge and example, to train those under them in the most effective use of aircraft as weapons of war.

So that the College may achieve its aim, it is essential for it to study, in conjunction with current Air Ministry policy, the operational roles of the Royal Air Force and the types of weapons and the flying and navigational equipments which they require. The College therefore provides practical instruction in the employment of weapons, in navigation and flying, and in the relationship between them. The flying programmes provide the opportunity for trying out the various techniques in all weathers, and they include liaison visits to operational commands and Commonwealth and Allied air forces.

The course lasts approximately one year, and its syllabus is designed to include:

(*a*) practical experience in operating modern aircraft, with a view to assessing their capabilities and limitations, including those problems associated with air and ground equipment;
(*b*) a study of all-weather flying and an assessment of the special problems involved;
(*c*) a study of the requirements of weapons, their correct selection, and the means whereby economy of effort can be achieved;
(*d*) practical experience in the use of weapons and their associated sighting equipments;
(*e*) instruction and experience in modern methods of pilot and crew navigation, and a study of the major problems and requirements;
(*f*) visits to appropriate research and development establishments, and to the Commonwealth and Allied air forces;
(*g*) participation in specific investigations arising from the analysis of operational requirements; and
(*h*) a study of the organisation of squadron training.

CENTRAL FIGHTER ESTABLISHMENT

Specialised post-graduate instruction and examination of fighter tactics and problems is undertaken at the Central Fighter Establishment. This unit advises and serves all R.A.F. Commands at Home and Overseas on all matters relating to fighter tactics.

The functions of C.F.E. are:

(*a*) to study the primary problems of the air defence system in the light of current and aeronautical advances and to visualise as far ahead as is possible the likely trends of future air attack and the defence against it;
(*b*) to devise methods of using fighter aircraft so as to increase their tactical efficiency in all offensive and defensive roles, wherever they may be called upon to operate;
(*c*) to evolve tactical principles calculated to obtain the best efficiency from the fighter forces of the Royal Air Force;
(*d*) to consult with the other Air Forces on the best employment of fighter forces.

It is of paramount importance that the Central Fighter Establishment achieves the highest possible efficiency in its role. Thus, the Commandant is responsible that only the highest quality of workmanship is presented. It is emphasised that the primary role and the most important function of the Central Fighter Establishment, is to devise, under the direction of H.Q. Fighter Command, an efficient means of combating attacks by high speed aircraft against the United Kingdom.

The principal methods for attaining the object are:

(*a*) by the constant physical review of fighter tactics at the Central Fighter Establishment, in the light both of new weapons and equipment and of further experience with existing material;
(*b*) by carrying out tactical trials with new equipment accepted for use by the Royal Air Force as directed by Air Ministry and Fighter Command;
(*c*) by regular visits by qualified and experienced officers of the Central Fighter Establishment to all R.A.F. Commands;
(*d*) by visits to other Air Forces and other countries as directed by the Air Ministry;
(*e*) collaboration with the Research and Development Establishments to study the progress of fighter development and to make recommendations to Air Ministry for the improvement of aircraft and equipment;
(*f*) the development of training methods either for specific operations or for general adoption in the R.A.F.;
(*g*) the training of squadron commanders, potential squadron commanders, and flight commanders, and (in the case of two-seater fighters) their navigators, to the highest possible standard.

The Central Fighter Establishment consists of a small administrative headquarters and directing staff, which includes specialist officers, a tactics branch, and a flying wing. The flying wing comprises:

(*a*) The Air Fighter Development Squadron.
(*b*) The Fighter Interception Development Squadron.
(*c*) The Fighter Support Development Squadron.
(*d*) The Day-fighter Leaders' School.
(*e*) The Night-fighter Leaders' School.

The directing staff serves as a pivot for the activities of the establishment, and it includes both Army and Naval components. The Naval component is known as the Naval Air Fighting Development Unit, and it is under the operational control of the Admiralty. The Army component is established at the Central Fighter Establishment for consultation and advice on all matters affecting the Army except anti-aircraft gunnery. It assists in the development of fighter close support for the Army and the training of fighter leaders in Army/air support and of Air Liaison Officers, and is under the operational and administrative control of the Central Fighter Establishment.

Inter-service training in which the R.A.F. plays an integral part is undertaken at the School of Land/Air Warfare and the Joint School of Anti-Submarine Warfare.

SCHOOL OF LAND/AIR WARFARE

The School of Land/Air Warfare is an inter-services establishment under the operational control of the Air Ministry and administered by Fighter Command. It consists of an Offensive Air Support Wing, a Transport Support Wing, and an Air Defence Wing. The headquarters and instructional staff contain a proportion of officers from all three Services. There are also a representative of the Canadian Army and a representative of the United States Air Force engaged in instructional and liaison duties. The charter of the Offensive Support and Transport Support Wings is:

(*a*) to teach a common doctrine in air support by holding courses of instruction for all three Services;
(*b*) to study all matters affecting the air support of armies, and to submit to the Service Ministries recommendations on matters affecting air support policy which may result from these studies; and
(*c*) to maintain a close liaison with similar organisations in commands at home and overseas.

The reference to air support in the Charter includes the assistance by air, both Royal Air Force and Naval Aviation, to the asasult, the land battle, airborne operations, air transported operations, and supply of armies by air.

The charter of the Air Defence Wing is:

(*a*) under the general direction of the Commandant, School of Land/Air Warfare, to study and disseminate a world-wide tactical doctrine to cover the inter-service aspects of air defence;
(*b*) to teach the methods of operational control and co-ordination of all forms of active defence over land and within range of shore-based radar cover: this excludes the air defence of fleets at sea outside the range of shore-based radar cover;
(*c*) to disseminate, by means of pamphlets and courses, inter-service tactical doctrine on air defence; and
(*d*) to establish and maintain liaison with the appropriate commands and establishments connected with air defence and to attend such trials as may be necessary.

The School of Land/Air Warfare runs a series of courses to cover all aspects of offensive and transport air support and air defence, which are attended by officers of all Services.

JOINT SCHOOL FOR ANTI-SUBMARINE WARFARE

The Joint School for Anti-Submarine Warfare is manned by a joint Royal Naval and Royal Air Force Staff. A Director (R.N.) is in general administrative command of the establishment. A Director (R.A.F.) is in operational and administrative command of all R.A.F. personnel on the strength of the Joint Anti-Submarine School. Associated with the school are destroyers and frigates of the Royal Navy and aircraft of the

Royal Air Force and Naval Aviation. The objects of the school are as follows:

(*a*) the training of formed units of ships and R.N. and R.A.F. aircraft in anti-submarine operations after completion of basic anti-submarine training; and

(*b*) the instruction of senior R.N. and R.A.F. officers in the broader aspects of anti-submarine warfare, with an emphasis on joint tactics.

A series of courses, attended by R.N., R.A.F., and Army Officers employed in combined operations duties, is held throughout the year.

OPERATIONAL TRAINING

Training within the operational squadrons is based on a syllabus which exercises individual pilots and crews in tactical exercises involving both practice and live bombing and gunnery, and in every role of the particular aircraft with which the unit is equipped. Squadrons are exercised individually, by Wings and by Groups progressively, culminating in large-scale Command or inter-command Exercises. Certain smaller-scale exercises involving the moves of units overseas enable crews to experience operating conditions under differing climatic and terrain conditions, and ensure that units maintain a high state of mobility which will facilitate their rapid concentration in a given area when the need arises. One notable example of this type of training is the routine flights throughout the year by aircraft of Bomber Command to the Middle East. Units are despatched to the Canal Zone at regular intervals for training in their operational role. Intensive training occupies the units for a period under conditions in the Middle East; on completion of this training units return to the United Kingdom. Inter-service exercises of limited size with the Army and Navy are carried out at unit level throughout the year; air demonstrations are given at inter-service establishments such as the School of Land/Air Warfare, and every opportunity taken to ensure that units are practised, in conjunction with the other Services in those roles involving air support of the other Services.

During 1949 the following main training exercises took place:

March 5th–13th. "*Forth/Clyde Exercise,*" the object of which was to provide practical experience for the personnel of the Royal Auxiliary Air Force Squadrons, the Royal Observer Corps, the Territorial A.A. Regiments and Fighter Control Units in the Forth/Clyde area and to exercise the Photographic Reconnaissance Organisation.

March 22nd–25th. Units of Coastal Command carried out an exercise with the Home Fleet involving the exercise of the command in its operational role, both in offensive and defensive operations. Anti- and pro-submarine operations were carried out in conjunction with carrier-borne aircraft.

June 10th–23rd. "*Flag Officer Submarines Summer War.*" A combined R.N./R.A.F. large-scale convoy exercise in the Atlantic featuring pro- and anti-submarine operations. Lancaster and Sunderland aircraft of Coastal Command took part.

June 25*th*–3*rd July*. "*Exercise Foil*" was held to exercise the air defences of the Air Defence network. All Royal Observer Corps Groups, Regular, and Territorial A.A. units in the area, and all R.A.F. and Royal Auxiliary Air Force fighter squadrons in the United Kingdom took part, together with aircraft of the air forces of the Western Union powers. Attacking units were provided by Bomber Command and the 3rd Air Division United States Air Force, who made simulated bombing attacks on selected targets.

July 4*th*–7*th*. "*Exercise Verity*." Combined Western Union fleet exercises. The exercise was designed to accustom the maritime forces of the Western Powers to work together in the defence of a convoy against submarines, surface craft, and air attack. Aircraft of Coastal, Bomber, and Fighter Commands provided the respective offensive and defensive forces, together with the air forces of the other Western Union countries.

Sept. 23*rd*–27*th*. "*Exercise Bulldog*." This exercise was designed primarily to practise the air striking force of Bomber Command in attacks against a highly organised defensive system and with the secondary object of exercising the air defences of the United Kingdom. The C.-in-C. Bomber Command had operational control of the attacking forces, which included units from other R.A.F. Commands, the U.S.A.F., and the Western Union Air Forces.

Oct. 1*st*–14*th*. "*Exercises Agility* 1 *and* 2." Combined exercises with the British Army, U.S. Army in Germany, and aircraft of the Royal Navy. Forces taking part included 7th Armoured Division, 4th Belgian Independent Brigade Group, one United States Tank Battalion, and an Armoured Car Regiment. Aircraft, including 'Vampires,' 'Spitfires,' and 'Mosquitoes' of the British Air Forces of Occupation and Royal Naval 'Seafires' and 'Fireflies' provided the air offensive and defensive Air Force.

The main exercises planned for 1950 are as follows.

(*a*) Coastal and Bomber Command exercises with the Home Fleet on spring and autumn cruises.

(*b*) Fighter and Bomber Command and U.S.A.F. aircraft with units of Anti-Aircraft Command, in a home defence exercise.

(*c*) Coastal Command exercise in conjunction with a Western Union fleet exercise.

(*d*) Air-defence exercise. Aircraft of Fighter and Bomber Commands, together with those of Western Union countries and the U.S.A.F. will take part. Anti-Aircraft Command and the Royal Observer Corps will also participate.

(*e*) Inter-service airborne exercise. Aircraft of Transport Command will co-operate with the Army.

(*f*) Exercise in conjunction with land forces. Aircraft of the British Air Forces of Occupation will take part.

TECHNICAL TRAINING COMMAND

TECHNICAL ORGANISATION

Before dealing with the work of Technical Training Command, which is responsible for the training of all officers, airmen, and airwomen in the technical and non-technical branches of the R.A.F., it is necessary first of all to review briefly the technical organisation of the Royal Air Force. Prior to 1939 officers for technical duties were of the General Duties (Flying) Branch who had received specialised technical training, supplemented by commissioned warrant officers. In July 1939 the Air Council approved a proposal to form a technical branch because the complexity of modern equipment required full-time employment of officers on technical duties, and withdrawals of officers for flying duties adversely affected their technical efficiency. In April 1940 the Technical Branch, composed of three divisions: Armament, Engineering, and Signals, was formed. It was manned by the transfer of General Duty specialists, commissioned ex-airmen, and R.A.F. Volunteer Reserve direct entrants. In January 1945 a Committee under the Chairmanship of Air Marshal Sir Roderic Hill was appointed to consider the post-war technical organisation of the Royal Air Force. Its recommendations were, firstly, that there should be an Air Member for Technical Services at the Air Ministry; secondly, that there should be a single technical branch with a common gradation list (though within the branch there would still be specialisation in armament, engineering, and signals); and, thirdly, that the training of technical officers should be unified to enable them to fill higher integrated appointments.

In January 1947 the Air Member for Technical Services was appointed and planning of the technical organisation began. The organisation provided for a co-ordinating head of the technical staff, i.e. the Air Member for Technical Services at the Air Ministry, a Senior Technical Staff Officer at R.A.F. Commands and Groups, with an Officer Commanding Technical Wings at R.A.F. Stations; three distinct divisions of the technical staffs to cover armament, engineering, and signals duties, and a co-ordinating technical section to cover aspects common to all three divisions. The organisation was implemented by the formation of four staffs within the Air Ministry, viz. Co-ordinating, Signals, Armament, and Engineering staffs. The Co-ordinating Staff is headed by a Director of Technical Policy, responsible to A.M.T.S. for long-term planning and co-ordination of common aspects of technical matters. The three main functions of his staff are technical planning, technical administration, and technical servicing. Technical planning is concerned with long-term requirements of man-power, organisation and equipment, and integrated technical policy; technical administration with technical organisation and administration, technical establishments, trade structure, repair capacities, and technical education; technical servicing with planned and rationalised servicing. The Signals Staff is composed of a Director General of Signals, with a Directorate of Signals established under the Air Staff; and a Directorate of Radio established under A.M.T.S., but directly controlled by D.G. of S. The D.G. of S. is responsible to the Air Staff for the work of the Signals Staff (planning and operation of signals facilities) and to A.M.T.S. for the work of the Radio Staff (installation, servicing, and repair of signals equipment). The Armament Staff consists of a Director

General of Armament and the directorate of Armament established under A.M.T.S. with a Directorate of Weapons established under the Air Staff. The D.G. of Arm. is responsible to A.M.T.S. for the work of the Armament Staff and to the Air Staff for the work of the Weapons Staff. The Engineering Staff is controlled by a Director General of Engineering, responsible for all engineering matters and technical training, who is directly responsible to A.M.T.S.

A similar integrated organisation exists at Commands, Groups, and Stations, but with certain modifications. In the junior ranks officers are employed mainly in their specialist capacity; all officers have a uniform career and are equally eligible for the higher command and staff appointments within the branch. The technical branch is responsible for all technical functions within the Royal Air Force and at Air Ministry level formulates the policy which governs Technical Training Command in its large training task.

The work of Technical Training Command, however, does not only include the control of all technical training establishments in the United Kingdom, but also the non-technical training establishments as well. It has, therefore, control of such diverse units as Reception and Recruit Centres, Officer Training Units, Specialist Courses, the R.A.F. Regiment Central School, of the Hospitals and Rehabilitation Centres and even the Overseas Transit Centres.

R.A.F. TECHNICAL COLLEGE

Officer technical training is carried out at Henlow, at the Royal Air Force Technical College. With the implementation of the new policy in 1947, whereby specialist officers of the Armament, Engineering, and Signals Branches are now amalgamated in the technical branch, new courses of instruction were introduced embracing a training in the specialist knowledge of all three. All the courses have lectures, demonstrations, practical work, and visits to civilian firms and to other Service units. Most of the lectures, however, are given in workshops where there is a range of equipment dealing with the respective subjects. A staff of education officers is responsible for teaching such basic subjects as mathematics, mechanics, science, and aerodynamics, and there is a Progress and Planning Department where syllabus time-tables are worked out and records kept. The Specialist Technical Course for direct-entry officers was started in 1949; the training of engineers is carried out at Henlow, that of armament officers at Lindholme, and of signals officers at Debden. Candidates for direct commissions in the technical branch are selected from those with degrees in engineering, physics, or mathematics and from those whose technical education has been recognised. Graduates of technical colleges and courses reaching to Higher National Certificates in mechanical and electrical engineering and apprentices whose lower standards are balanced by their wider experience and training are included in this category. The Royal Air Force Technical College is being built up on sound and flexible lines; by this means it will meet the need for well trained officers in a highly technical service.

APPRENTICE TRAINING

The training of Aircraft Apprentices in the higher trade groups has proved to be one of the most successful experiments ever made by the Royal Air Force, and it is with the name of Halton that the aircraft apprentice scheme is associated in the Royal Air Force. Although several Royal Air Force Stations have shared in the training of Aircraft Apprentices, it can be said that the technical excellence of the service has rested to a very large extent on the sure foundation of this all-important part of the training structure of the Royal Air Force.

The Aircraft Apprentice scheme was planned by Marshal of the Royal Air Force Viscount Trenchard, and it was under his leadership and inspiration that it was started at Halton in February 1920. The output from this school has provided the technical backbone of the R.A.F. and it was on the skill and high devotion to duty of those who trained at this school that much of the success of the air in World War II belonged. Aircraft Apprentices are accepted between the ages of 15½ and 17 and are attested on entry of 3 years' apprentice training followed by 12 years' Regular service. The trades are: Fitter II (Airframes); Fitter II (Engines); Fitter (Armourer); Electrician, Instrument Maker, Air Radio Fitter, and Ground Radio Fitter. The first five trades are taught at Halton, Air and Ground Radio Fitters are trained at the Radio Training School, Cranwell.

The Aircraft Apprentice has wide prospects for a career in the Service. Cadetships are granted to selected apprentices at the R.A.F. College, Cranwell, for commissioning in the General Duties Branch, and facilities are also available for grant of commissions in the Technical Branch, the Equipment Branch, and the R.A.F. Regiment. Apprentices in the Signaller and Engineer categories are also eligible for training as a pilot or navigator.

The syllabus of training consists of General Service Training, Educational Training, and Technical Training, with more time for educational training in the first year and more for technical training in the last year. At the end of the three years' training at Halton or Cranwell, apprentices complete a year of "improver" experience.

Apprentice technical training is carried out in trade categories; each apprentice begins his training in workshops devoted to the use of tools and other basic craftsmanship. As they progress through the stages of training they go for a period in each year to an airfield where they learn to apply the lessons of the workshops in the maintenance of modern aircraft.

Air experience is given to every Aircraft Apprentice during his training. That the system of Aircraft Apprentice training is sound and the training excellent has been proved in peace and war.

The Administrative Apprentice Scheme was inaugurated in May 1947 as a revival and extension of the pre-war Apprentice Clerks Scheme. The trades in which administrative apprentices are trained are clerk (general duties), clerk (accounting), and equipment assistant. The training which at present takes place at R.A.F. Station, St. Athan, normally lasts for 16 months and is followed by about 8 months' special experience, which includes productive work. Candidates must be between the ages of 15½ and 17½ and must have had a good general education. They are interviewed by a selection board and are required to pass certain intelligence and aptitude tests and are eligible for cadetships on passing out from apprentice training which will lead to permanent commissions in the various branches of the R.A.F. as in the case of Aircraft Apprentices.

TRADE AND RECRUIT TRAINING

The introduction of the National Service Act has added additional responsibility to the task of the Command by introducing into Service life large numbers of young men from all sections of the community and making them, in the short time available, useful components of the Royal Air Force.

The object of training in the Royal Air Force is to develop trainees to a point where they can fill adequately a place within the organisation. Such factors as length and conditions of service and the physical, moral, mental, and educational standards of personnel volunteering or called up for service, plus the need for a balanced force, have a very large impact on the training organisation.

To provide the facilities necessary for the training of R.A.F. and W.R.A.F. personnel, approximately 24 main and 20 miscellaneous training schools, giving over 100 different courses of instruction, are established within the three training Groups under the control of Technical Training Command. The main training schools undertake Administrative, Radio, and Technical Trade training. The miscellaneous schools cater for Recruit Training, Officers Advanced Training, the training of Equipment and Secretarial Officers; Officer Cadet Training, Cookery, Fire Fighting; the R.A.F. Regiment, Physical Training, Marine Craft Training, Dental, Photography, Bomb Disposal Radiography, and all the many other essential training courses that the R.A.F. trade structure demands.

In general, both Regulars and national servicemen report to a Reception Depot on joining the R.A.F., where they are attested, kitted, and medically examined. From the Reception Depot the recruit proceeds to one of the four Recruit Centres in the Command, where he stays for approximately 8 weeks. At the Recruit Centre a well-balanced syllabus of training is given. The training includes talks on Service life, the history and battle honours of the R.A.F., discipline and *esprit de corps*, maintenance of kit, equipment, and barrack rooms, the purpose of drill and saluting, hygiene, pay and allowances, social services in the R.A.F., and the civilian rights and duties of an airman or airwoman; drill and parades with and without arms and the application of fire and bayonet fighting, rifle practice, field craft and physical training complete the syllabus. There are Trade Information Rooms at Recruit Centres in which a recruit can find details of all trades open to Regulars and national servicemen, together with photographs of the trade in operation and samples of tools and equipment concerned with it. The recruit decides on the trade he wants and during the fifth week of the training he is given aptitude tests and interviewed by a Selection Board as to his suitability for trade training. The Selection Board takes into account many factors, such as the recruit's civil occupation or training, his educational standard, the length of service he has opted to serve and the existence of vacancies for training in the particular trade of his choice. As far as possible the Selection Board recommend the recruit for trade training in the Royal Air Force in the trade of his choice. It must be emphasised that in all cases this is not possible, as many of the more specialised trades in the Royal Air Force are of many months' duration; the national serviceman, due to the limited time he has to serve, is therefore automatically debarred from specialised trade training.

From the Recruit Centre trainees go to a school for trade training. This may be a school of technical training, a school of administrative trades, or to a radio school. At the end of the trade training, trainees are assessed by the Central Trade Test Board and are drafted for service in the Operational and Training Commands.

RESERVE COMMAND

The training of the R.A.F. Reserve and Volunteer Reserve, the Royal Auxiliary Air Force (except Royal Auxiliary Air Force fighter squadrons), and the University Air Squadrons, is deputed by the Air Ministry to Reserve Command. This Command is responsible for the non-continuous training (i.e. training carried out outside the period of annual continuous training with the Regular force) of all flying, technical, and non-technical Reservists. During the period of embodiment in the Regular Force for their period of annual training, Reservists are attached to one of the operational or training commands; on completion of this training they once again revert to non-continuous training under the control of Reserve Command. The Command controls six Groups, each of which is responsible for all reserve training in a geographical area roughly coincidental with the area of the Army Commands in Great Britain and Northern Ireland. Within the areas controlled by these Groups, and usually near large centres of population, are located:

(*a*) Reserve Centres where non-continuous Reserve, ground, technical, and non-technical training is carried out under qualified R.A.F. and civilian instructors.

(*b*) Reserve Flying Schools where flying training on 'Chipmunk' or 'Anson' aircraft is carried out by reserve pilots, navigators, and signallers.

(*c*) University Air Squadrons at which members of the universities are given initial flying instruction as pilots on 'Tiger Moth' aircraft by qualified R.A.F. flying instructors.

(*d*) Air Observation Post Flights of the Royal Auxiliary Air Force equipped with 'Auster' aircraft maintained by the Royal Air Force and flown by Territorial Army (R.A.) pilots.

(*e*) Fighter Control Units manned by personnel of the Royal Auxiliary Air Force whose duties form an integral part of the air defence organisation.

(*f*) Light Anti-Aircraft Squadrons of the Royal Auxiliary Air Force Regiment whose duties include the defence of airfields against low-flying attack.

(*g*) Air Traffic Control Units of the Royal Auxiliary Air Force engaged in aircraft control duties at all airfields; and

(*h*) Royal Auxiliary Air Force Mobile Servicing Sections attached to Royal Auxiliary Air Force Squadrons to carry out the day-to-day servicing of all squadron aircraft.

The Royal Auxiliary Air Force fighter squadrons, equipped as they are with 'Meteor' jet fighters, form an integral part of the front-line fighter defence force and are under the operational control of Fighter Command.

The complex task of operating modern aircraft requires a large number of officers and men skilled in their respective trades. If full advantage is to be taken of the developments in aviation and its attendant services it is clear that quality in the individual and in his instruction must be of primary consideration in his selection and training in the Royal Air Force. It is to this end that the efforts of Flying Training and Technical Training Command, with the assistance of Reserve Command, are bent.

"AJAX"

CHAPTER XXV

POST-WAR DEVELOPMENTS IN MILITARY AIRCRAFT

TECHNICAL REQUIREMENTS

THE PROGRESS in development of military aircraft is summed up for us by the performance of two production aircraft. To put the most striking first, a heavy bomber has flown 2,000 miles at an average speed of 607 m.p.h.; and a standard fighter, with full military equipment, beat world's record speed by flying over the course at 670 m.p.h. The first is Boeing B47, styled the 'Atom Bomber'; and the fighter is the North American 'Sabre.'

NECESSITY OF REACTION JET FOR HIGH SPEED

In both types these high speeds could never be reached by propeller-driven aircraft; the speed of the tip of a propeller is the sum of the forward speed of the aircraft plus the circumferential speed of the tip, a total exceeding the speed of sound even in 500-mile-an-hour aircraft. Due to the effect of compressibility of air at these tip speeds, the efficiency of the propeller begins to fall off from 450 m.p.h. of forward speed; and at 650 m.p.h. would be less than 10 per cent., nine-tenths of the engine horse power being wasted. So the first necessity for sonic or supersonic speeds—speeds or at above the speed of sound in air—is a propeller-less engine; some form of reaction jet, whether it be turbine or rocket, or both, must be used.

AERODYNAMIC CLEANNESS

The second necessity has been described, in a recent authoritative paper, as "aerodynamic cleanness." Mr. Richards lists some of the developments which have contributed to the speed of aircraft:

> "(*a*) Wing cleanness, including the effect of wing smoothness, flush riveting, transition point, leading edge slots, and fillets.
> (*b*) Control cleanness, including the effects of forward balances, air leakages and controls set over.
> (*c*) Body cleanness, including flush cockpits, suppressed aerials, nacelle drags, pitot masts and the like.
> (*d*) Inner cleanliness of internal flows inside aircraft, including engine intake losses, cabin air flow and cooling air." *

In a diagram this paper shows the transition from the biplanes of 1920 to the jet aircraft of 1950, and points out that the latter have only one-third the drag of the biplane, with its forest of struts and cross wires, open cockpits, guns and gun mountings, and bombs on racks, quite apart from fixed undercarriage and tail skid. The high drag resulting from the design, or lack of design, of old-fashioned aircraft was greatly reduced by the coming of the monoplane with cantilever wings, requiring no external struts and few bracing wires; a further advance resulted from the retractable undercarriage and tail skid and the closing-in of cockpits and turrets.

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* "A Review of Aerodynamic Cleanness," by E. J. Richards, M.A., B.Sc., A.F.R.Ae.S. *Journal of R.Ae.S.*, March 1950.

Thirdly, when the great power of jet engines made much higher speeds possible, these speeds disclosed the necessity of improvement at points where drag had not previously been a matter of importance. These improvements, some of them since 1945, include the thin wing, tandem cockpits gently faired in, wheels in tandem also (though this was necessitated by the thin wing), and the removal of drag due to engine cooling equipment such as radiators or intakes. But the mere addition of debris guards to jet engine intakes, to obviate birds or flight mechanics being drawn into the compressor, reduced the speed of a four-jet aircraft by 8 knots and its payload by 800 pounds.

INCREASED WING LOADING

The old high-drag aircraft were lightly loaded; if the wing loading had been high, the gliding angle would have become very steep. Speaking of his own designs, Sir Frederick Handley Page in a lecture to the Royal United Service Institution said:

> Early biplanes, such as the 0/100, had so much parasitic drag that, with high wing loadings, the gliding angle would have been excessive and the machine would have landed like a brick. The gradual cleaning up of aircraft—in the change from biplanes to monoplanes, in the cleaner fairing of fuselage and power plants, and in the use of the retractable undercarriage—has so reduced drag, that it has been possible greatly to increase wing loadings without too adversely affecting the gliding angle, even with the higher values of induced drag that result from the higher lift coefficients obtained by the use of wing flaps. But, although structure weight percentages have been maintained more or less constant by the use of high wing loadings and the consequent reduction in wing span, the use of these high wing loadings has only been possible at the expense of higher landing speeds, which in turn have necessitated the building of prepared long runways. If wing loadings are to be still further increased—and much higher values are spoken of—Service aircraft operation will become more and more dependent on the availability of runways and, therefore, aircraft may lose that flexibility in operation which should be one of their main characteristics.

COMPRESSIBILITY

Though they may frequently have appeared in the *Proceedings of the Royal Aeronautical Society* before and during the war, it is only since the war that words and phrases like "the speed of sound," "compressibility," and "shock waves" have become part of the language, and are now found in every newspaper. The changes in design listed in the preceding paragraph have been forced upon us by the attainment of aircraft speeds not much below the speed of sound, at which speed the air becomes compressible instead of fluid. Instead of moving aside almost before the aircraft wing reaches it, the air has to be thrust apart, with an immense increase in the power required to force the aircraft through it.

The principle is exactly the same with water. A stone dropped into a still pond produces ripples which correspond to those of sound in air, except that the ripples on water are two-dimensional, restricted to a plane surface, while the ripples of sound in air are three-dimensional, spreading outwards in all directions. At speeds below the natural speed of the ripples, a boat or a barge can be moved with one finger and a whole string of barges can be drawn by one tired old horse. But for three times the speed, 100 horse-power is required, and the tugboat piles up the water in what is, in effect, a shock wave.

NEED FOR LOW DRAG

Similarly with aircraft, the drag of every type is known, and the horsepower required at varying speeds can be calculated. This was done for the 'Spitfire' soon after the war ended, by Mr. George Carter of Gloster Aircraft, the designer of the record-breaking 'Meteor'; his chart shows the increase of drag on the 'Spitfire' between 450 and 680 m.p.h., requiring thirty times as much horsepower at the higher speed as compared with the lower.

Of course, no designer nowadays would try to produce an aircraft for high speed which looked like the 'Spitfire.' The "new look" is something like the 'Venom.' Mr. Carter, dealing with specialised design for high speed, goes on to say:

> Supersonic speed, more than 750 m.p.h. at sea level, might be achieved by a small research aircraft. It would need very thin wings, a body just large enough to hold engine, fuel, and pilot, and nowhere to stow the undercarriage which would be dropped after take-off. Assuming the drag of the aircraft to be 75 lb. at 100 m.p.h. at sea level, its drag at the speed of sound at 30,000 feet might be as much as 4,000 lb., so that it would require about 7,250 h.p. to fly at sonic speed at that altitude." *

VARIATION OF SPEED OF SOUND WITH ALTITUDE

This quotation brings out something more about the speed of sound: the horsepower is calculated at "the speed of sound at 30,000 feet altitude," which is not quite the same thing as at sea-level. The lower the temperature, the less the speed of sound—about 760 m.p.h. at 60° F. at sea-level, or 660 m.p.h. at 35,000 feet, from which height upwards there is no further fall in temperature, as far as aircraft other than space-ships are concerned.

An aircraft designed to be safe at 660 m.p.h. at sea-level, 100 m.p.h. less than the speed of sound at low altitude, might be subjected to severe stresses at quite ordinary altitudes of 30,000 to 35,000 feet at the same true airspeed. To save pilots becoming confused by the diminishing margin of safe speed as they climb from sea-level to altitude, it has become the custom to define the speed of the aircraft, at any altitude, in relation to the speed of sound.

MACH NUMBER AND LIMIT OF SAFE SPEED

This ratio is called the Mach number, or Mn, after the scientist who first related the temperature of air to the speed of the sound wave. To take an example from the speed of a modern jet-bomber, the Boeing B.47 is stated to have a speed of 607 m.p.h. at 40,000 feet, or, at that altitude, a

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* *Jet Flight*, by John Grierson. Sampson, Low, Marston & Co.

Mach number of 0·92; the same speed at sea-level would be 0·80 Mach number. The Mach-meter in an aircraft capable of these high speeds not only shows the Mach number, to warn the pilot of his approach to sonic speed, the speed of sound, but may also indicate by means of a pointer the limit of safe speed at varying altitude. When this is combined with the ordinary airspeed indicator, the pilot knows that he is safe till the A.S.I. needle reaches and passes the broad-arrow shaped pointer showing maximum safe air speed.

In 1917 the pilot of a British biplane with a good speed in the dive sometimes had the satisfaction of seeing the wings fall off a fleeing German-built Fokker monoplane—that is, the German had exceeded the maximum safe speed for that type of aircraft. But until the coming of jet aircraft there was no such limitation needed in British aeroplanes: why is it necessary now?

TURBULENCE AND THE SHOCK WAVE

The design reason has been stated in technical language by Sir Frederick Handley Page: "Detail design must be . . . carefully studied so as to delay as far as possible the onset of local supersonic velocities on aerofoil surfaces. This also entails much more accurate manufacture of the external profiles of wings and fuselage."

The aircraft itself may be flying below the maximum safe speed and below the speed of sound, and the airflow over wings and fuselage may be smooth and unbroken by turbulence. A similarly smooth flow may sometimes be seen over the lip of a weir, with the dark water slipping smoothly over the green weed; but if half-way down there is a stone protruding even half an inch, the water breaks into white foam and froths down the smooth face of the weir to the deep pool at its foot. To put it in another way, turbulence develops in the water at that point, and a violent agitation of the water continues down the slipstream to the tail of the weir.

But for the stone, all the water on the weir would be moving at the same surface speed; but the protruding stone forces that part of the water to go a longer way round without parting company with the general flow, and so imposes on it an increase of speed. The pressure on the water is increased also; the increase of speed and pressure together with the turbulence provide a visible example of a shock wave. Massive weirs on great rivers abroad have been torn to pieces by the shock wave developing at a single weak spot.

Imagine instead of the water flow, the flow of air over the carefully streamlined fuselage nose of a jet fighter; somewhere after that nose there must be a protruding cockpit enclosure, and to get by it the streamlined flow of air must go the long way round. If the speed of the aircraft is close to that of sound, the speed of the air over the cockpit may become more than sonic, the development of "local supersonic velocity" referred to in an earlier paragraph, with all the dangers that accompany a blast of turbulent air moving across fuselage and wings at 700 m.p.h.

DEVELOPMENT OF SHOCK WAVES, AND SHOCK STALL

The shock wave, a sudden increase of pressure, is visible in water; in air, it is visible only to the eye of the camera, but its presence, with resulting turbulence, can be shown on an aircraft wing studded with wool tufts, in the method of Professor Sir Melville Jones in 1929.

In the Cantor Lectures of 1946, Dr. Hooker of Rolls-Royce explained in great detail the development of shock waves as the Mach number increases:

> With a well-designed wing, speeds up to M =0·7 are possible without compressibility troubles, and in such circumstances the drag of the wing is due to the turbulent wake of air which it leaves behind. This turbulent wake is formed by the air flow refusing to follow the curved surface of the wing over the whole of its length, and in breaking away from the surface reverse flows are formed which generate the wake. The earlier the air flow breaks away from the surface of the wing, the higher will be the drag of the wing; and in general, this break away occurs almost immediately following the point on the wing surface where the air pressure begins to rise.
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> Considering the same wing section at M =0·75, waves begin to form on the upper and lower surfaces. These waves are akin to those formed at the nose of a flying bullet, and which when received by the ear result in the "crack" which is heard. In passing through any one of these waves the air will suffer a sudden rise in pressure, and consequently will tend to leave the surface of the wing. Thus, the formation of shock waves on the wing surface has two adverse affects:
>
> (*a*) It causes a drag on the wing due to the energy absorbed by the air in generating the waves, and
>
> (*b*) It increases the profile drag of the wing (and reduces the lift) by causing the air flow to separate from the wing surface, such as occurs when a wing stalls. Hence, the expression "shock stall" of wings.
>
> Furthermore, as we increase the speed of the wing from M =9·75 up to M =1·3 (the latter figure depending upon the shape of the wing), *we find that the waves on the surface of the wing move forwards, thus causing the separation to take place earlier.*
>
> Such a regime of air flow, in which the flow pattern changes as the speed or angle of incidence of the wing is changed, is evidently unstable, the position of the wave flicking about on the surface of the wing according to local small changes in conditions. This gives rise to severe buffeting and vibration, particularly on the control surfaces, and may render an aircraft completely unstable. In fact, the buffetting and vibration which pilots complain of when diving machines at high speeds is due to the flicking of the shock waves about the controls and wing surfaces.*

Dr. Hooker said that to avoid as much as possible the difficulty of control when this happens, "One should never loiter about close to the speed of sound, above or below it."

THE TREND OF DESIGN

Nothing can be done to obviate entirely the formation of shock waves, or local rise of pressure, at sonic speeds, But the whole trend of design of jet aircraft is directed towards the following design points:

(i) Minimising the rise of pressure, as by using the thin wing and the sharply pointed nose, sometimes styled "the supersonic nose."

(ii) Designing the aircraft with long, slender lines, including engine nacelles (if they cannot be avoided) which are more cigar-shaped than egg-shaped. The engine nacelles of de Havilland 'Comet' are a lesson in this art.

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* "High Speed Flight," by Dr. S. G. Hooker, B.Sc., D.I.C., in *Journal of Royal Society of Arts*, March 29, 1946. Quoted by courtesy of the Secretary.

(iii) Reducing the surface area of the aircraft, since drag is dependent upon it; the fuselage must be small, compact, and above all short. Omission of the conventional tail reduces the surface area and overcomes the possibility of tail buffetting due to the turbulence following a shock wave which has developed on the wings.

(iv) Sweepback of wings, tail unit, and fin, which makes a gradual entry of these surfaces into air which is being compressed; as regards the wings, sweepback reduces the effect of a shock wave or line of pressure, as it does not develop along the whole length of the wing at once, as with one at right angles to the fuselage.

(v) Avoidance of protrusions or excrescences which may result in local supersonic velocities; there must be a cockpit enclosure, but it should be as small as possible, and pilots could sit in tandem where there are two of them.

(vi) The elimination of surface roughness, protruding rivet heads, plate joints, gaps at aileron or elevator.

LAMINAR FLOW AND THE BOUNDARY LAYER

Theories in regard to laminar flow and the boundary layer were put forward by Prandtl nearly fifty years ago. But the coming of supersonic aircraft renders laminar flow of the greatest importance. Of course, air does not really flow in layers or laminations, slipping smoothly like a highly polished pack of cards; but the layer of air against the skin of the aircraft, the boundary layer, may be standing still, while a layer ¼ inch above is moving at 600 m.p.h.

Laminar flow means that if there were layers, there is insufficient friction between them to cause turbulence, or a breaking up of laminar flow similar to the water on the weir. But that turbulence on an aircraft might be caused by a projection of less than 1/1,000th of an inch. Dead flies, dust, hail or rain might be disastrous to the lift of a supersonic wing, by breaking up the flow at the leading edge; and the leading edge of experimental aircraft has sometimes been fitted with cellophane covers, to be torn off in flight after reaching non-fly altitude.

The greatest friction occurs between the boundary layer, standing still, and the moving layer next above it; this friction tends to turn or rotate the stationary particles of air, and as soon as this happens there is a transition from laminar flow to turbulence, and a shock wave at that point. The aim of the designer of supersonic aircraft is to defer this transition to a point as far back on the wing as possible; hence the thin wing, the avoidance of projections, super-streamlining, and dead-level and highly polished surfaces. The need for a perfectly level surface may lead to the use of thicker material than sheet metal for wings, such as machined aluminium or magnesium, the latter being much lighter.

Though the real boundary layer, the particles in actual contact with the wing, is stationary, a layer two particles thick would be moving in the direction of the main air flow; and it is in these two "layers" that turbulence develops, quite apart from a drift of particles in an undesirable direction, as towards the wing-tip, thus evading their duty of helping to supply lift. One McDonnel production aircraft has little fences chordwise to prevent "boundary layer drift"; while turbulence can be deterred or minimised by drawing off the boundary layers by means of an aperture in the wing just at the point where particles might begin to rotate.

DESIGN FOR HIGH-ALTITUDE FLIGHT

The jet engine provides the military pilot with the ability to fly high as well as fast, both needed for operational applications. But flight at altitudes previously far out of reach brings its own aerodynamic problems, as the difficulties and dangers produced by flight close to the speed of sound are reinforced by the tendency to stall at higher and higher speeds as the air becomes less dense with height. A de Havilland 'Vampire' Mk. I fitted experimentally with a Ghost engine has flown in the region of 60,000 feet to investigate these difficulties.

The flight confirms the interesting conclusions reached in an article entitled "Flight at High Altitude":*

> At any altitude, the available speed range of a given aeroplane is limited, at the low-speed end by the stall and at the upper end by the highest Mach number at which flight is possible. Because of the greatly reduced density at great height, the true speed and hence the Mach number for a given indicated speed are much higher than at sea-level. Thus the available speed band decreases with increasing height until the Absolute Aerodynamic Ceiling is reached, which is defined as that altitude at which the aircraft is at once just stalling and yet on the verge of compressibility vice at the same speed.

For a representative aircraft, that altitude might be 60,000 feet, the height at which flight is only just possible; but

> the ability to fly straight and level is of small use in wartime if the slightest manœuvre causes a loss of altitude. This makes the height of 50,000 feet a reasonable Operational Aerodynamic Ceiling for the hypothetical aircraft being considered.

This leads to the conclusion that low wing loading is necessary for sufficient control at altitude; but it may be remarked that low wing loading means greater area of wing and greater drag, with reduced forward speed for a given power or thrust. The other alternative is speed sufficient to pass through the sonic barrier, that range of speeds round about Mach 1 at which the aircraft is unstable, and so reach stability combined with a greater margin above the stalling speed.

With modern aircraft with clean lines and smooth surfaces, the natural gliding angle is very flat; and in a dive the speed may become dangerous:*

> On a very clean aircraft a steepening dive may be also dangerous, as it can easily cause acceleration to very high Mach numbers, followed possibly by more acute control difficulties in the transonic speed region. For this reason it is essential that an aircraft flying near its aerodynamic ceiling should be fitted with adequate means of controlling compressibility effects. There are several ways of doing this. The first, and best, is to fit controls which retain their effectiveness right through the transonic speed range. Failing this, a second method is to fit a dive-recovery flap, designed to give extra lift and a nose-up pitching moment which will initiate recovery.
>
> A third method is simply to fit a drag brake, i.e. a flap giving drag only, with little associated lift or pitching moment. This method is less effective

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* "Flight at High Altitude," by G. W. Trevelyan, M.A., and J. C. Wimpenny, Grad.R.Ae.S., *de Havilland Gazette*, April 1949.

than the others; should the aircraft get into a steep dive at high altitude, it is very difficult to provide sufficient dive-brake drag to prevent a further rise in Mach number. Dive brakes are, however, often fitted for another reason; in the event of an emergency they facilitate a quick descent to lower altitude.

The other points of design for altitude are those with which we are already familiar—the pressure cockpit and the ejector seat.

AIRCRAFT DEVELOPMENT

ATTAINMENT TODAY IN HIGH SPEED AIRCRAFT

Perhaps the best way of demonstrating the high-water mark of aircraft development is to list the aeroplanes which exceed 600 miles an hour by a good margin. It is not possible to put them in any order of speediness, in view of the different methods, in different nations, of expressing speed. Thus, a British figure says, "Maximum speed in level flight at sea-level 650 m.p.h." But American figures say, "Speed more than 650 m.p.h." Russian figures are baldly stated, sometimes exceeding world's record speed, and are probably designed speeds or speeds devoutly hoped for. So the aircraft in Table 1 are in order of the nations concerned, and within each nation alphabetically. Blank spaces mean that speeds and weights may still be secret; and speeds stated are those claimed, as a rule, rather than those observed and logged.

As statements of speed cannot be relied on or are not available, none has been shown in the Table; but practically all of these aircraft should be able to exceed 650 m.p.h., the speed at which the horsepower of their jet engines has been calculated. With one exception, they are single seaters; and it is an astonishing indication of post-war development that the pilot in the Rolls-Avon 'Meteor' has nearly 20,000 h.p. at his disposal—six times the power of the Bristol Centaurus or Napier Sabre.

The Table includes only some of the 650 m.p.h. aircraft, omitting those specially built for the use of the Royal Navy or the United States Navy, which, as regards the latter, cover some of the best and fastest American aircraft. Experimental aircraft are included where they are likely to be produced as a military type.

The Gloster 'Meteor' deservedly heads the list, and when engined by a pair of Rolls-Avon turbines must be by far the most powerful single-seater in the world. It was designed by Mr. W. G. Carter of Gloster Aircraft to embody the first Whittle turbine; and their hopes and fears, failures and successes, are chronicled in *Jet Flight*, written by their test pilot John Grierson, and referred to on page 249. In the lecture by Dr. Hooker, a chart showed the engine requirements to overcome drag at increasing speeds; and for the aircraft most nearly perfect, he chose the 'Meteor,' which corresponds in cleanness very closely with the ideal curve. The tremendous thrust of these great turbines enables the 'Meteor' to reach 40,000 feet in close on four minutes. In common with de Havilland jet aircraft, it is lightly loaded; neither of these productions is likely to be excelled for some time as a high-altitude fighter.

The de Havilland 'Venom,' of which weight and performance are not stated, is the development of the Ghost-engined 'Vampire,' which in 1947 reached 59,446 feet altitude. Compared with the 'Vampire,' 'Venom' has moderate sweepback and a reduction of the thickness/chord ratio, making a thin wing. Drop tanks on the wing-tips have improved rather than detracted from the airflow over the wings, and in some conditions of flight there is a reduction of the overall drag. The de Havilland Ghost engine of 5,000 lb. static thrust would give over 8,500 h.p. at 650 m.p.h.

The weights of the new 'Meteor' with the Avon and the 'Venom' with the Ghost have not been stated; but one might hazard a guess that the new design weighs 2,500 lb. more than the 'Meteor' with two Rolls Derwents, making a total of 19,000 lb. Similarly, one might add 1,500 lb. to the known weight of the 'Vampire,' and guess that the 'Venom' might weigh 14,000 lb. Dividing these guessed weights into the known thrust of the engines, factors are obtained of 0·63 for the 'Meteor' and 0·36 for the 'Vampire.' The latter figure is the same as the North American 'Sabre,' which holds the speed record, and which takes 10 or 11 minutes to reach 40,000 feet.

Hawker have two aircraft intended to be land-based: P.1040 (also produced in a Royal Navy version as N.7·46) and a research aircraft developed from it, styled P.1052. Powered by a single Rolls-Royce Nene of 5,000 lb. static thrust, its range is stated to be little short of that attained by modern propeller-driven fighters. That of Hawker 'Sea Fury' with drop tanks is about 2,000 miles.

To give the aircraft a range comparable with the 'Sea Fury' it has been necessary to find space in the fuselage for more than double the amount of fuel. As is now well known, the problem was solved by ejecting the exhaust through twin nozzles behind the wings, which besides allowing an efficient fuselage tail-end of conventional design, permits the installation of an extra-large-capacity fuel tank aft of the engine.

P.1052 is even more beautiful in its slender lines. It has been designed to investigate the problems of control, swept wings, and the onset of compressibility. No details are given; but in May 1949, under bad-weather conditions, it averaged 618 m.p.h. between London and Paris.

Supermarine 510 is developed from their 'Attacker,' but has swept wings to delay compressibility effects and give improved performance. The 'Attacker' is stated to reach 585 m.p.h., and climb to 30,000 in seven minutes. Both the 'Attacker' and S.510 have the Rolls-Royce Nene, and for the 'Attacker' ratio of thrust over weight is 0·36, as with the 'Vampire.'

Consolidated Vultee Aircraft Corporation of U.S.A. is sometimes styled Convair; their experimental interceptor has delta-wings, and with the Allison J.33 turbine and span of only 31 feet, it may prove to be very fast; but the thrust/weight ratio of 0·34 does not give promise of rapid climb, and high span-loading and probable high wing-loading might make it uncontrollable at altitude. Over 70 test flights have been made (April 1950), disclosing low drag and excellent manœuvrability at transonic speeds; the U.S. Air Force is reported to be considering a larger engine to make supersonic speeds attainable.

The fastest Lockheed aircraft is likely to be their penetration fighter USAF—F90, a twin-engined single seater. The two Westinghouse turbines total 6,000 lb. static thrust; and speed is stated at over 650 m.p.h. Its lines are good, with supersonic nose and 35° sweepback; its use is stated (in *Aero Digest*, August 1949) as "designed specifically to penetrate deep into enemy territory, search out military objectives, and destroy them." The wings are ultra-thin, with 35° sweep, and other surfaces similarly swept back. The pressurised cockpit has ejection seat and air conditioning.

McDonnell aircraft have always been fast, and those built for the U.S. Navy had thrust/weight ratios of more than 0·40; they are styled 'Phantom' and 'Banshee.' The latest is numbered USAF XF.88 penetration fighter and named 'Voodoo.' It is stated to fly at 700 m.p.h., though this may be with afterburning, described later. Engines are Westinghouse turbines giving a total thrust of 6,000 lb., and thrust ratio is 0·4. Ailerons, rudder and elevators are power operated; and speed can be rapidly controlled by large air brakes. The 'Voodoo' can cruise satisfactorily on either engine alone. Afterburners are now fitted to the turbines.

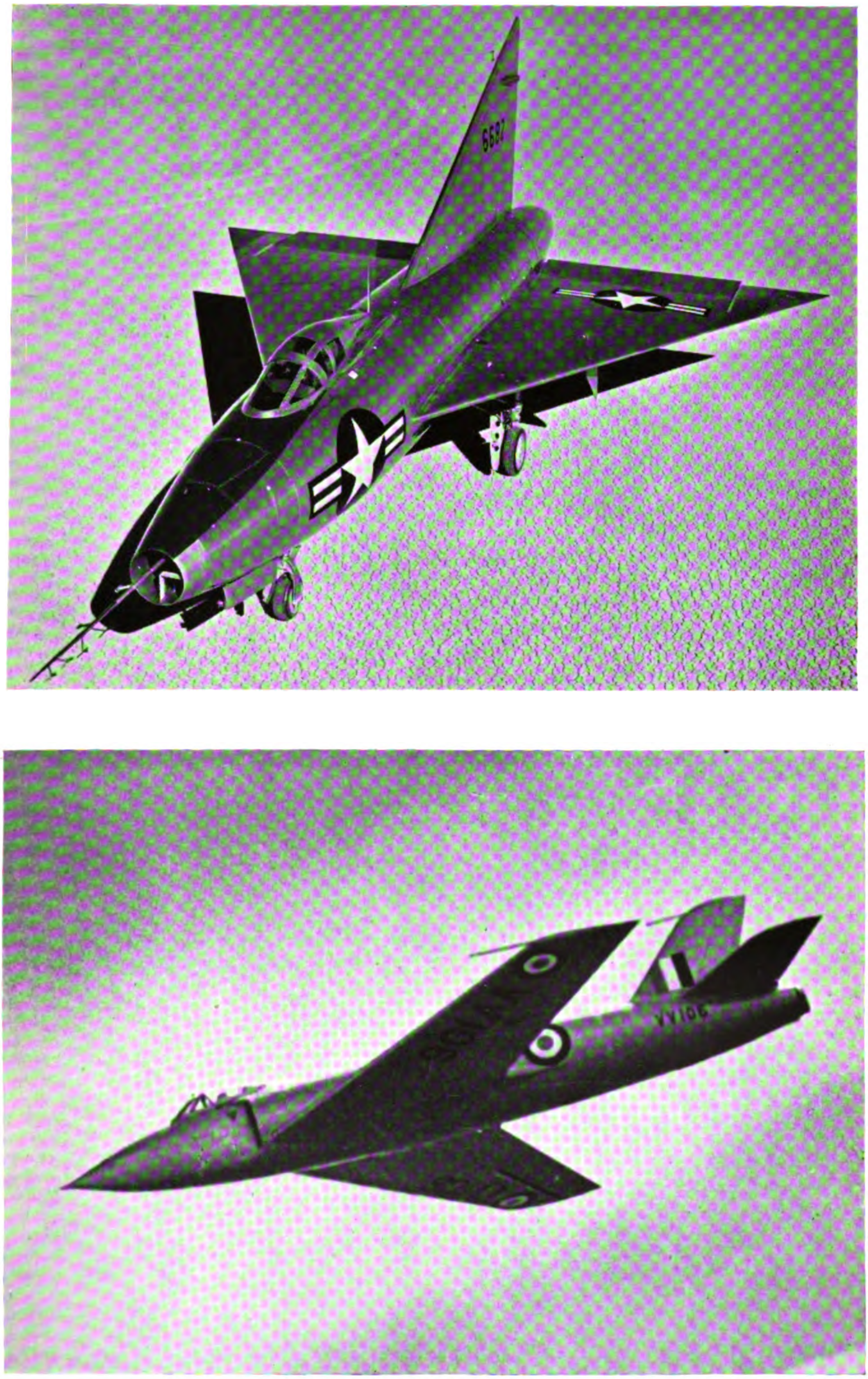
The North American 'Sabre' holds the world's record at 670 m.p.h. and nowadays this is said to be the test speed for production aircraft. A total of 554 are on order, and many have been delivered. An experimental variant "has been given added thrust," but with the same engine fitted with afterburners. No details are disclosed, but speed may reach 700 m.p.h. Both the 'Sabre' and YF.88 have wings swept back 35°, and both have one General Electric J.47 turbine, of 5,000 lb. thrust. Another experimental aircraft, XF.88, similar to the 'Sabre,' has a Pratt and Whitney turbine, based on the Rolls-Royce Nene, and giving 5,000 lb. thrust; apart from the engine, it is likely to correspond to YF.88.

Another North American penetration fighter for the USAF is YF.93A; the span is 39 feet and thrust 6,250 lb. without an afterburner. The engine is Pratt and Whitney J-48, based on Rolls-Royce Tay, and has intake ducts streamlined flush with the side of the fuselage. There are automatic slats and slotted type flaps. This aircraft flew for the first time in January 1950; the pilot said that if it had been available for air battles with the Japanese he could have been "a one-man Air Force."

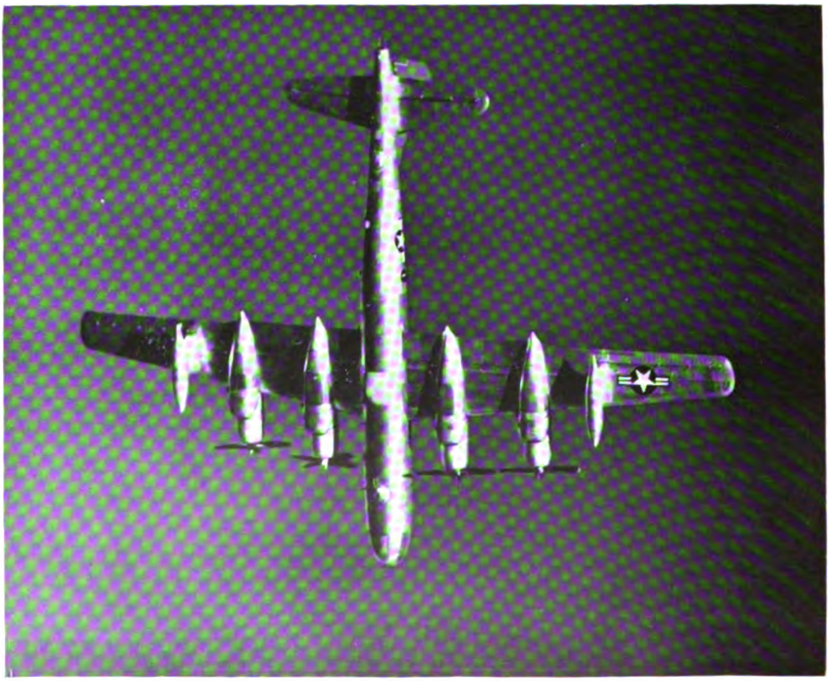
Republic Aviation Corporation have produced, in their 'Thunderjet,' a worthy successor to the 'Thunderbolt.' Allison J.35 turbine provides 5,000 lb. thrust. Speed is more than 600, and range more than 850 miles. The service ceiling is stated to be 45,000 feet. The armament includes six 12·7 mm. machine guns, eight 5-inch rockets, 2,000 lb. of bombs, two 500-lb. fragmentation clusters, depth charges, and incendiary bombs in various offensive combinations. Bomb and rocket carriers are retractable or jettisonable after use. The wing tanks are provided with aerodynamic fins. The pressurised cabin has air conditioning.

Although the new Republic high altitude interceptor was flown a year ago, not very much information has been released. This aircraft is remarkable for a variable incidence wing; in January 1950 the makers said:

> XF-91 makes use of the principle of inverse taper on its swept-back wings, producing a wing which is wider at the tip than at the fuselage intersection, and houses a tandem-type landing gear. Another XF-91 feature is the variable incidence of the wing, permitting a high angle of attack for take-offs and landings and a thin, razor-like attack angle for high-speed flight. The flight tests show conclusively that the inverse taper wing successfully reduces wing-tip stalls due to loss of lift experienced with conventionally tapered wing-tips. The inverse taper combined with leading edge slots makes possible flying at speeds lower than are possible with any other jet fighter, giving the XF-91 the double advantage of high and low speed performance. In addition, the extra thinness of the wing at the fuselage junction reduces drag and permits a more even flow of air at this point. The XF-91 now utilizes the J.47



(*a*) Consolidated Vultee Delta-Wing Research Interceptor XF 92A
(*b*) Vickers 510



(*a*) Saab J-21R Jet Fighter of the Swedish Air Force
(*b*) Boeing B-50.D Medium Bomber of the U.S.A.F.

> turbo jet engine (5,200 lb. thrust), made by General Electric, plus after burning, for its main power plant. At a later date, four rocket motors are to be installed for use in obtaining rapid rate of climb to high altitudes and additional power in combat."

France has two high-speed fighters, with differing characteristics; the Marcel Dassault 450 'Ouragan' weighs only 12,000 lb., and the Hispano-made Nene gives at least 5,000 lb. thrust. This gives a thrust-weight ratio of 0·42, which will bring it into the de Havilland class for speed of climb and performance at great altitude. The other is heavily armed by British standards, six 20-mm. cannon against our usual practice of four such guns. It is stated to reach 33,000 feet in ten minutes, as compared with 25,000 in five minutes for 'Ouragan.'

Another fighter which may be compared with de Havilland products is the Swedish Saab J-29, an excellent aircraft all the better for being powered with de Havilland Ghost. Though this aircraft flew in 1948, little is known of it; but the *de Havilland Gazette* of October 1948 says:

> The prototype and its two successors have de Havilland-built Ghost engines (5,000 lb. static thrust) and production aircraft will have Ghosts built under licence in Sweden by Svenska Flygmotor A.B.
>
> The design aim on which the Saab engineers have based their work is the attainment of a very thin swept-back wing constructed as a continuous, rigid, and smooth shell. To this end all ancillary equipment—guns, ammunition, fuel, and the whole of the undercarriage and retracting gear—is accommodated in the fuselage, where doors and other installations can more readily be arranged without affecting the strength or shape of the structure, particularly as the directly-ducted Ghost needs no nacelle pressurisation. The estimated top speed of the J.29 is about 650 m.p.h., making it one of the world's fastest fighters.

In the American *Aero Digest* of March 1950 there were some idealised drawings of a new Russian fighter, with swept-back wings and other surfaces, and tail plane on top of the fin, well clear of the jet. The report goes on to say:

> Having the services of topline German designers at their disposal, the Russians found that they could produce advanced airframes; but the only propulsive units available (the M-003 and M-004), developments of turbojets that existed in Germany at the end of the war, were notorious for their poor thrust and high expendability. The answer to this problem was obtained from the last source to which Russia looked for help. The origin of this "timely" assistance was Great Britain, who furnished the highly delighted Russians with 55 Rolls-Royce turbojets of the Derwent and Nene type.
>
> Both the Derwent and Nene are simple centrifugal compressor-type engines, well suited to Soviet mass-production methods. In the two years that have elapsed since the importation of these turbojets, Russian engineers are certain to have adapted one or both for home production."

The general appearance of the Russian fighter makes it appear as though they had seen a picture of the American Martin XB.51, a heavy fighter with 55 feet span and three General Electric J.47 engines each with 5,200 lb. thrust. Other Russian fighters are imitations of German war-time designs, with imitations of German war-time engines; it is safe to say that the Russian Nene will have a very short life. The flying life between overhauls of German turbines was reported by Sir Roy Fedden to be about 40 hours, as compared with 600 to 1,000 hours for turbines made by Rolls-Royce or de Havilland.

NIGHT FIGHTERS WITH TURBINES

No night-fighters have been claimed by the Russians, apparently, and they will certainly be needed to cope with the 600-m.p.h. 'Atom Bomber.' In this country and in U.S.A. the small number of night-fighter types produced, with jet engines, embody the cream of night-flying experience. Reliance on radar rather than on sight, whether by day or night, necessitates a second member of the crew, and radar equipment which, even if miniaturised, will still be bulky in total. Similar equipment may prove to be needed by day, at 50,000 feet, where the sky is dark blue in colour owing to the absence of dust or water vapour particles which make the light visible.

American night-fighters are styled "all-weather aircraft," suggesting that day use of radar may be necessary in bad visibility or at altitude; and this will be the trend of British design. In both countries there has been a slight lengthening of the fuselage to accommodate the radar operator and equipment. This is stated to have improved the airflow and led to a slight increase in speed.

The de Havilland experience with night-fighting 'Mosquitos' and 'Hornets' has been embodied in the 'Vampire' specially built for the same use:*

> As might be expected, the layout of the two-seat cockpit of the 'Vampire' night-fighter is in all major respects a replica of the 'Mosquito' Mk. 38 cockpit. The position of the radar operator beside and slightly aft of the pilot ensures a close degree of co-operation which is essential for effective radar interception. The diameter of the Mosquito fuselage is approximately the same as the 'Vampire' single-seater and the fitting of a two-seat cockpit to the 'Vampire' involves no increase in the overall diameter of the nacelle, although it is increased somewhat in length to accommodate the A.I. radar apparatus. The main components of the night-fighter airframe aft of the rear cockpit bulkhead are identical with those of the standard 'Vampire' which is already in full production; and, in fact, the night fighter can be fitted into the existing production line without delay and without any interruption to the existing flow of other 'Vampire' marks. The maximum level speed of the 'Vampire' at 30,000 feet is 521 m.p.h., against that of 400 m.p.h. for the 'Mosquito' at the same height.

'Vampire' is in service in many other nations who will be ranged in opposition to "the potential aggressor," in Mr. Winston Churchill's phrase; the two-seater night-fighter nose could easily be fitted to the 'Venom' with its Ghost engine:†

> For any air force which is at present operating 'Vampire' day fighters, a night-fighter variant is offered, and with it the 'Venom,' a day fighter of outstandingly higher performance, its design readily adaptable for night-fighting duties, becomes expeditiously available without the necessity for any basic conversion so far as piloting, maintenance, and administration are concerned.

Counting the Douglas 'Skynight,' built for the U.S. Navy, America has three fighters for night or all-weather applications. The other two are the Lockheed F.94A and the Northrop "All-weather Interceptor, F.89," styled the 'Scorpion.' Lockheed F.94A has one turbine and the others two.

The Lockheed spans 34 feet and weighs 15,710 lb. gross; it is developed from their 'Shooting Star,' and like the 'Vampire' it has the same wing and fuselage structure as day interceptors built in the same factory. The nose is greatly extended to house the radar equipment and the operator. The electronic equipment includes ground communication of intelligence, so that the pilot can be directed to the enemy by the ground controller; the pilot's own screen, additional to that of the radar operator; gun laying equipment with firing automatically opened and controlled; a radar tail warning (which might be combined with a tail gun); identification; radio altimeter; beacon and beam receivers; and two-way radio for ground-controlled approach.

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* *de Havilland Gazette*, February 1950.

† *Ibid.*, October 1949. Page 19.

The Northrop 'Scorpion' has two Allison J.35 engines providing 10,000 lb. thrust; it weighs 30,000 lb., of which, doubtless, far more than 1,000 lb. will be electronic equipment. There is a crew of two; and "decelerons" are fitted to serve as ailerons, landing flaps, and dive brakes.

JET BOMBERS FOR ARMY AND AIR FORCE

The term "jet bomber" may be applied to any bomber which has jet engines, even where used only to supplement piston engines, and this permits the inclusion in Table II of Consolidated Vultee (Convair) B.36, some day to be superseded by an equally immense B.52 with eight turbines of perhaps 7,000 lb. thrust each, say 75,000 h.p. at 500 m.p.h. However, in the meantime B.36 operates comfortably at 40,000 feet altitude and has a range of 10,000 miles. It has two pressurised compartments, connected by a tunnel 85 feet long, in which a four-wheel truck runs on rails to connect the two. It is heavily armed, with six retractable, remotely controlled turrets and a flexible mounting in the nose, fourteen 20-mm. cannon in addition to a 37-mm. cannon in the tail—a battle-cruiser of the air.

The Northrop YB.49 is the 'Flying Wing.' It spans 172 feet and weighs loaded 200,000 lb.; it is described as a long-range aircraft, though few details are given. The crew number seven, and there are folding bunks for six reserve members, the whole in pressurised nacelle. Like the Boeing, it has at present six Allison turbines. Its armament is worthy of quotation:

> Two electrically operated four-gun turrets, one above and one below wing, offset to starboard of wing centre-line, and four electrically operated, remotely controlled two-gun turrets, one above and one below each wing between outer engines and wing-tips. Fire-control blister towards end of central nacelle.

Because the smooth and level planes of the 'Flying Wing' are suited to the application of boundary layer control, the makers are understood to be making experiments on the effect of slots in the wing, to draw off by power suction the turbulent element of the boundary layer. The Armstrong-Whitworth A.W.52 research aircraft would be almost equally suitable for similar experiment. Northrop engineers say that the boundary layer "develops miniature eddies and turbulences which claw at the surface of the airplane, creating a large part of the drag which holds the plane back, wasting its fuel and shortening its range." Though this is over-simplified, satisfactory control of the boundary layer on so large an aircraft would undoubtedly result in a great economy of fuel. It is estimated by Northrop's Dr. Pfenninger that success in his experiments might lead to the same speed being attained by only two of the eight turbines.

Boeing B.47 has been styled the 'Atom Bomber,' and must be by far the most advanced bomber in the world. Its ratio of thrust to weight is equal to that of most fighters; it has exceeded 600 m.p.h., and on wings of 116 feet span has a 35-degree sweepback, with other surfaces at an equivalent angle. The wheels are in tandem, with light outriggers on the wings. Blind-bombing radar is fitted.

Consolidated B.46 is another good-looking aircraft, with its four engines in two nacelles, one on either wing. The leading edge appears to be at right angles to the fuselage, without any sweepback, and maximum speed is not stated, though cruising is given as "over 500 m.p.h." It has no hydraulics whatever, and all auxiliary effort is applied by high-pressure pneumatic power.

The North American 'Tornado' was the first four-jet aircraft to fly in the U.S.A. It has four General Electric J-47 jet engines; water injection is used to increase power at take-off. The lines are good, like those of a modern fighter, and it is entirely free of protruding turrets or other equipment. Pilot and co-pilot sit in tandem in a pressurised cockpit. The four engines are arranged in pairs in single nacelles on each wing. Hydraulic boost action is used to operate elevator, aileron, and rudder controls, so that only 5 per cent. of the energy required to move these controls is applied by the pilot. Flaps and the tricycle landing gear are operated hydraulically, and the trim tabs electrically.

Martin XB-51 ground-support plane is another bomber with lines like a fighter, except that two of the engines are hung beneath the fuselage, the third being in the rear of the fuselage. The crew is only two, pilot and radio-operator-navigator. Both are in a pressurised, air-conditioned cockpit. There is an integral parachute-brake for landing.

The English Electric 'Canberra' looks like a fighter, but with its 64-feet span has engine-power exactly the same as the 'Meteor' with 41-feet span. It is the first British jet-bomber to fly. The Rolls-Royce Avon turbines are said to develop 6,500 lb. of thrust. It is intended for high-altitude, high-performance bomber duties; and American journals speculate whether it may not be the forerunner of a four-Avon high-speed big bomber.

SOME MILITARY TRANSPORTS

The "world's largest land-based aeroplane and champion weight-lifter is Consolidated Vultee's XC.99 cargo-transport," with a record pay-load of 50 American tons. The landing gear is of the roller-skate type. The two-deck fuselage can carry 400 troops with combat equipment, or more than 300 stretcher patients plus medical attendants and five-man crew. Another type has forward and rear loading ramps for the transport of armour. A new design would deliver a load of 50 tons of tanks, guns, and troops from bases in the eastern United States non-stop to bases in England or Western Europe.

Douglas C.124A, 'Globemaster II,' is also designed to carry troops, general cargo, and such heavy equipment as tanks, field guns, bulldozers, and fully loaded trucks; it will carry 50,000 lb. of pay-load 850 miles, unload, and return without refuelling. The clamshell doors in the nose provide an opening 11½ feet square; there is a built-in ramp for vehicles and the cargo space exceeds 10,000 cubic feet, in a "cabin" about 13 feet square by 77 feet long. In the centre there is an electrically operated elevator for quick movement of general cargo. Alternatively, the 'Globemaster' will carry 200 troops with field equipment, or 136 stretcher patients with 52 attendants or ambulatory cases. Evolved from Douglas C.74 'Globemaster,' the new aircraft uses wings, empennage, and engines of that transport.

The Boeing C.97A 'Stratofreighter' has a maximum load of 53,000 lb.; and with less pay-load will reach 30,000 feet and range 3,750 miles. The upper deck is 60 feet long, and the aircraft will take freight or wounded or troops—83 stretcher cases and attendants or 134 fully-equipped troops. One similar aircraft used on the Berlin air-lift carried 2,000,000 lb. of cargo on its first 27 flights.

Amongst British transports, the Vickers 'Valetta' is basically the 'Viking 1B'; it has a heavy-duty floor and a large-double-entrance door permitting the loading of trucks or guns. Stretcher supports are permanently installed, and as an ambulance 20 stretcher cases and two sitters can be accommodated. It can also be used as trooper, freighter, paratroop duty, glider tow, or supply dropping, with a roller-conveyor leading to the paratroop door.

The Bristol Type 170 freighter can be applied to casualty evacuation, troop carrying, paratrooping, aircraft salvage, fuel transport, and miscellaneous supply work. It has nose-loading doors, and remarkably good times have been recorded for the loading and unloading of guns, lorries, armoured vehicles, tanks, and aero-engines. In the supply-dropping version there is a roller-conveyor at floor level, curving at the end where it reaches the door.

RUSSIAN AIRCRAFT AND ENGINES

There is no doubt that Russia is building large numbers of aircraft; but a very high percentage of their military aircraft would be considered to be obsolete by Western standards. Indeed, one of the features of their post-war design of either engine or aircraft has been an utter reliance on five-year old features of Western products, including Germany:

> The A.M.30 engine was directly based on the German B.M.W.VI, but incorporated Rolls-Royce type airscrew reduction gearing, an Hispano Suiza type accessory drive, and an Allison-type supercharger. . . . The ASH series has been developed from the Pratt and Whitney design. . . . M.88B is based on Gnome-Rhone design. . . . VK.100 was based on the Hispano-Suiza 12 Y. . . . M.62.JR is the Wright Cyclone built under licence.*
>
> Mr. Bridgman does not mention in this volume the Russian turbines installed in their new jet fighters; nor need he have bothered to do so, since those known to be in use have been described and illustrated in the German section of his last Annual. From other sources it is known that the Russian M.003E is Design 003E of the Bayerische Motoren Werken Flugmotorenbau G.M.B.H., better known as B.M.W.003E; M.003R is a variant of it; with its power augmented by a rocket; M.004D is the Jumo or Junkers 004D; and, most interesting of all, the M.018 is the B.M.W.018.†

It will be seen that copying extends even to the Mark number or name, and this is so with some of the aircraft. Thus, there is a tail-first aircraft styled 'Utka,' or 'Duck,' which is a copy of the Focke-Wulf 'Ente,' or 'Duck.' One of the two Russian bombers is a Chinese copy of a Boeing B.29 to the 1940 specification, built in 1943 and force-landed in Russia in 1944; the other probably has German turbines designed in 1942.

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* *Jane's All the World's Aircraft*, 1949–50, compiled and edited by Leonard Bridgman, published by Sampson Low, Marston and Company, Ltd.

† "Milestones of Military Aviation," in *Journal of the Royal United Service Institution*, November 1949.

The latest fighter has a really good engine—the Rolls-Royce Nene; but only 55 engines were supplied, and a home-made product is certain to be quite a different affair.

As in Hitler's Germany, any expert designer who might have a tendency to think for himself will probably have been purged; so the new fighter may have been designed by a team of German scientists. It has excellent lines; will be lightly armed and lightly equipped; and so, with the 5,000-lb. thrust of a new British-built Nene, should reach 650 m.p.h., or 40,000 ft, with little difficulty. Span and weight are not known; it might be, of course, a large aircraft seen from far off.

AERO-ENGINES

JET ENGINE THRUST AND HORSEPOWER

As with the aerodynamics of the high-speed aircraft, which within the post-war years have necessitated a new language of flight, the development of the internal combustion engine in the same period presents aircraft operators with the need for re-orientation of ideas.

Thus, the horsepower of the jet engine increases with speed; and even at the end of the war few military users of aircraft would have expected a single-seat fighter to use 20,000 h.p., reach 40,000 feet in four minutes, and fly at speeds close to 700 m.p.h., like the Rolls-Avon-engined 'Meteor.' At half that speed the horsepower would only be about 10,000 for the two engines put together. Engine-makers state the power of their engines in terms of static thrust dry, which means the measured thrust of the reaction jet when the aircraft is standing still. "Dry" means that the volume of hot gas emerging from the jet at about 1,000 m.p.h. is not increased by the injection of water, fuel, or a mixture of the two.

Fortunately, the translation of "thrust" into horse-power, at a given speed, is simple: each pound of static thrust will provide 1 h.p. at 375 m.p.h., or 2 h.p. at 750 m.p.h. when that speed is attained; and proportionately in between these speeds. The turbine generates far more horsepower than this static thrust will provide at speed: this has been put into words which cannot be bettered by Major F. B. Halford, Technical Director of the de Havilland Engine Company Limited, in explaining the simplicity of the gas turbine:*

> The compressor draws in the cold air from the wing air intakes and supplies it, compressed to about 40 lb. per sq. in., to a series of combustion chambers where fuel is injected and burned. The expanding mixture of air and combustion products drives the turbine and is then ejected rearward—still with great residual energy. It is the reaction from this rearward jet which provides the forward thrust on the aircraft.

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* "Jet Propulsion," by Major F. B. Halford, F.R.Ae.S., M.S.A.E., Chairman and Technical Director, de Havilland Engine Company, Limited; *Journal of Royal Society of Arts*, August 16, 1946.

> The only purpose of the turbine is to drive the compressor, which is mounted on the same shaft and requires over 6,000 h.p. to turn it at its operating speed of 10,500 r.p.m. Incidentally, in the Ghost the turbine has to generate 10,800 h.p. to drive the compressor at full speed and at sea-level. The velocity of the gas after driving the turbine is still over 1,000 m.p.h., which is equivalent in thrust—when flying at sea-level at 550 m.p.h.—to an engine of about 5,200 h.p. driving an airscrew having an efficiency of 75 per cent., or, in the case of the Ghost—when flying at 650 m.p.h. at sea-level—equivalent to an airscrew-type engine of over 18,000 h.p., with an airscrew efficiency of 50 per cent.

The shaft horsepower of the jet engine in a high-speed fighter is devoted to driving the turbine; and no account is taken of this when stating the power of plain jet engines; but horsepower is still a useful figure when the turbine drives a propeller. Nomenclature has altered even there, because in addition to the horsepower available at the propeller, there is a certain amount of static thrust from the exhaust jet. This is shown in Table V, together with the equivalent additional horsepower at some easily attainable speed like 375 m.p.h., so as to provide the total horsepower of the "turboprops," as the Americans call them. So to distinguish between the propeller horsepower and that of the jet the former is stated as shaft horsepower, usually abbreviated s.h.p.

Weight per horsepower has changed, too, and is now stated by engine-makers as "Dry weight per pound of thrust." These figures, where known, are shown in Table V, together with an approximate "pounds per horsepower" at the speed stated, to show the improvement in that figure due to Air Commodore Whittle and his invention, in this country, of the gas turbine, which for high speed aircraft supersedes the reciprocating engine.

Fuel consumption is also stated in some cryptic formula like "Lb./lb./hr." Interpreted, this means "Amount of fuel used, in pounds, per pound of static thrust." For some modern jet engines this figure is about 1 lb., or 5,000 lb. per hour for an engine like the de Havilland Ghost. If the aircraft were slow, at 375 m.p.h., 5,000 h.p. would be available for an hour; but if a fast fighter, 8,500 h.p. and 650 miles in the hour, for the same fuel, round about a gallon to the mile.

ADVANTAGES OF JET ENGINES

In the reciprocating engine one stroke in four is a power stroke; if every stroke were a power stroke, the engine would be about one-quarter the weight. In the jet engine the flow of power is continuous, and turbines approach a weight per horsepower of ¼ lb., as compared with 1 lb. per horsepower of the reciprocating engines.

But this is not the only advantage: as far back as 1946 Dr. Hooker summed the others up as follows:*

> (i) The process of combustion being continuous, the elaborate valve mechanism is removed.
> (ii) For the same reason, magnetos and sparking plugs are not required.
> (iii) The engine is self-cooled under all conditions.

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[*] "The Application of the Gas Turbine to Aircraft Propulsion," by Dr. S. G. Hooker, B.Sc., D.I.C., D.Phil., A.F.R.Ae.S., *Journal of Royal Aeronautical Society*, May, 1946.

(iv) The absence of reciprocating motion reduces external vibrations and eliminates many of the troubles associated therewith. Vibration problems throughout the aircraft will be diminished.

(v) The absence of reciprocating motion reduces main bearing load and makes possible and desirable the use of anti-friction bearings of the ball and roller type. These reduce the heat to oil, and thus the necessity for an oil cooler is avoided with the jet engine. The friction of the pistons on the cylinder walls being absent, mechanical losses are practically non-existent and the power output at high altitudes considerably improved.

(vi) Because of the continuous action of the gas turbine the fuel is burnt in the combustion chambers at constant pressure, and there are no peak or fluctuating pressures to be withstood. Consequently, the combustion chambers can be of a light fabricated construction and there is no necessity for the heavy castings and liners associated with the cylinders of piston engines, which have to withstand peak pressures in excess of 1,000 lb per sq. in.

(vii) If reduction gears and airscrews are fitted, then the smooth torque of the turbine must ultimately have a great effect on lightening the gears and the airscrew blades.

(viii) The stresses and heat flow in the rotating parts are amenable to analysis and rig test in scaled form, thus adding to the speed and certainty of development.

(ix) Whereas the reciprocating engine had a development period of from five to ten years, it is now clear that a similar state of mechanical reliability can be reached on jet propulsion units in about one to two years.

CENTRIFUGAL OR AXIAL COMPRESSION

Just as there is a compression stroke in the piston engine, there is a compression stage in every turbine. The air is partly forced into the engine by the forward speed of the aircraft and partly drawn in by the suction of the compressor. The amount taken in is between 150 and 200 tons per hour in fighter-size turbines.

The simplest form of compressor is that in which the air enters at the centre of the compressor disc, which revolves on the same shaft as the turbine and is driven by it. The air is prevented from rotating with the compressor disc by guide vanes which direct it to the circumference of the disc; and as the compressor disc may be revolving at 10,000 r.p.m. the air is flung outwards at more than six times its entering speed, a compression ratio of six to one. As stated previously, the compressed air then enters the combustion chambers, entering each simultaneously, and there the oxygen combines with the burning fuel (a continuous power stroke) before passing out, through the turbine blades, to the exhaust jet.

The de Havilland Goblin and Ghost have guide vanes on one side only of the compressor disc, permitting a single straight-through entry for the air; the Rolls-Royce Nene and Derwent follow the original Whittle design, in having guide vanes on each side of the disc, thus requiring two intake or entry openings.

The hot gases from the combustion chambers, travelling at over 1,000 m.p.h., strike the turbine blades at an angle and drive the turbine round. Allison, the American turbine makers, say that their blades weigh about 1½ lb. each, and each single blade generates the same power as the engine of a 30 h.p. car. The single or double row of turbine blades provides a total of more than 10,000 h.p.

Of course, if the process were reversed and the turbine were rotated by a 5,000 h.p. electric motor (as has to be done on test) the blades would drive the air instead of being driven by its passage; and this is what happens in the other type of compressor, in which the air is travelling parallel to the shaft, or the longitudinal axis of the complete engine—hence the term "axial flow."

If the axial compressor had a single row of blades, like many turbines, it would be styled a single-stage compressor; but if it had several rows, each arranged to increase the pressure of the air passed on to it by the preceding ring of blades, or "stage," then it is called a multi-stage compressor. The more stages, the greater the compression ratio and the greater the economy of fuel. Increase of compression ratio increases the total length of the turbine by a very small amount, but not its diameter.

To increase the speed of the air being compressed by a centrifugal type compressor, however, it would be necessary to drive the compressor faster (limited by the strength of the materials and the inefficiency due to turbulence when the speed of sound is exceeded) or to increase the diameter of the disc so that its circumferential speed is greater. The latter makes a bigger engine frontal area, larger fuselage or nacelle, and increased drag.

But there are advantages in the centrifugal type which will result in its being used for military purposes for years to come. The first is its simplicity, and a few dozen turbine blades instead of perhaps 2,000 in the compressor alone; secondly, somewhat lighter weight; thirdly, ease of manufacture and maintenance; fourthly, low cost in comparison with the axial flow type.

For these reasons, engines like the Rolls Nene and the de Havilland Goblin are eminently production engines, manufactured by or sold to other nations for embodiment in their own aircraft.

AFTERBURNING OR REHEAT

The pressure within the exhaust nozzle, and the speed with which the gases escape can both be increased by injection. Injected water turns into steam, and in that state increases the pressure on account of the increase in its volume; injected fuel increases the pressure and the temperature at a point where turbine blades will not be affected by the hotter flame.

While this injection lasts there will be an increase of power, or thrust, up to 25 per cent. of the previous maximum, and this may be of great advantage at take-off or in any air emergency during combat. But while injection lasts the fuel consumption may be increased at least 100 per cent. Another minor disadvantage is that the nozzle, for maximum efficiency, would be smaller for the maximum power of the engine continuously than for the additional power obtained with afterburning; and therefore the complication of a variable sized nozzle has to be faced.

Afterburning becomes possible because the whole of the oxygen in the air is not used up in the combustion chambers—if it were, the temperature would be too high for the turbine blades. There is a twofold limitation to the amount of fuel which may be used for afterburning: the temperature must not rise so high as to melt the nozzle, and it is a waste of time injecting fuel once the oxygen has been exhausted, and there is no surplus.

INSTALLATION OF JET ENGINES

At one time aircraft designers would have been satisfied with jet engines in nacelles in the wings; but the thin wing necessitated by today's high speeds would become inefficient with a fat nacelle on either side of the fuselage. Single engines go inside the fuselage, and their intake ducts take up room there which is needed for fuel tanks—since the thin wing will not take these either—or retracting undercarriage, or both.

Another alternative is to carry the engine on struts or pylons below the wing, in a container which the Americans call "pods." One writer has suggested that in case of fire, or to reduce drag should an engine fail, pod and engine should be detachable at will, to be jettisoned like fuel in an emergency. The jet engine in pod is most used at present by the few large American bombers with piston engines (for long range), to be augmented occasionally by using one or more jets for a small proportion of the time or in emergency, such as take-off of combat.

Some of the big turbines are shown in Table VI. The American firm of Pratt and Whitney have been the first to admit the debt they owe to Rolls-Royce, Ltd. Their engines of 5,000 and 6,500 lb. thrust respectively are modelled on the Rolls Nene and Tay. For several of the newest engines, British or otherwise, figures have been taken from American sources.

Of these engines, the Rolls Avon is an axial-flow type as regards the compressor, while their other engines, intended for mass-production, have centrifugal compressors. All turbines are axial flow. The Rolls centrifugal compressor has guide vanes on both sides of the compressor disc, and needs two intakes or entries for the air; the de Havilland Ghost and Goblin are both centrifugal also, and have guide-vanes on one side. The two Pratt and Whitney engines mentioned above correspond to Nene and Tay in having double-sided centrifugal compressors.

Axial flow compressors are used in the Avro (Canada) Orenda, and the General Electric J.47; the American firm of Allison, like Rolls, produce both axial and centrifugal flow types of approximately the same horsepower, and this permits a comparison of fuel consumption—J.35 is axial flow, with 1·05 lb. of fuel per cruising hour, and J.33 is centrifugal flow, with 1·12 lb per lb. of static thrust in each case.

PROPELLER-TURBINES OR TURBOPROPS

Nothing but jet engines in which *all* the power is derived from the reaction of the jet would provide sufficient power for an attack on the sonic barrier, that region of turbulence and instability which lies on either side of the speed of sound; and in addition, the higher a jet aircraft flies, the less the drag; the faster it flies, the greater the horsepower exerted by the thrust of the jet. But for ten years to come military services will need heavy-weight and other medium-speed aircraft; and at medium speeds and altitudes, the fuel consumption of the all-jet engine becomes uneconomical.

The alternative is a propeller instead of a jet; but piston engines have reached their zenith in high power and light weight, in the 3,500 to 4,000 h.p. engines which weigh about 1 lb. per h.p. But when turbines are employed to drive propellers, there will be propeller limitations before the maximum size of engine is reached, and one of the American "turboprops" is stated to be capable of 10,000 h.p. Most of the propeller-turbines lie, in weight per horsepower, between 0·45 and 0·75 lb.

Even if this improvement in weight per horsepower were not available, the turboprop would still have great advantages over the piston engine: no carburettor or ignition; far fewer parts; no reciprocating movement; continuous power instead of one power stroke in four; minimum maintenance; brief period of development of a new design; high-flash point fuel and therefore reduced fire-risk; small frontal area; no external cooling such as radiator or ducts; and ease of installation.

The design of the all-jet turbine is intended to extract the maximum of power from the jet and to lose as little as possible to the shaft on which turbine and compressor are mounted; so the turbine is usually of single stage, a single row of blades. But the propeller absorbs almost all the power of the turbine in a turboprop, and the jet effect is quite small, so the turbine may have several stages. As fuel economy is of importance, the axial flow compressor is most frequently used; and this gives a long, slender line to the engine, in addition to the small frontal area.

Considering the reduction in revolutions, from say 15,000 on the turbine shaft to about 1,500 on the propeller shaft, the gears are wonderfully light and simple; but when two engines are coupled together to produce very large engines yet with small frontal area, the gear becomes disproportionately heavy. In some of the "double-turbines" shown in Table V the weight of the gear can be estimated by subtracting double the weight of one engine from the total. It has been stated that the weight of gear and extension shaft for the Allison T.40 is 500 lb. The shaft is a long one, which permits the engine to be buried well back from the leading edge if necessary.

There are about fifteen large propeller turbines flying today; Table V shows some of them. The figures, including the newest British engines, are taken from American sources, much more candid than we are about our engines as well as their own. It should be pointed out that the "double-turbines" embody a form of free-wheel, permitting either engine to be started, run, and stopped independently; the other will then continue to drive a counter-rotating propeller, with great fuel economy.

THE WAY AHEAD

It is not difficult to foresee much slower development of both aircraft and engines during the coming twelve months as compared with progress during the post-war years. Designers may be compared to a motorist who has driven furiously across the level towards a range of hills, which he then has to climb in first gear.

It is possible that new height and speed records will be set by British aircraft; nothing in the world compares with the Rolls-Avon 'Meteor,' which might well capture both records. But the height may not exceed 65,000 feet, and the speed may be below 700 m.p.h. Greater power may be expected from axial-flow turbines, such as the Avon and Avro Orenda, as well as improved fuel economy, and less weight per horsepower.

No jet-bomber, in the period ahead of us, is likely to better the Boeing 'Atom-Bomber,' or even to equal it; nor is anyone likely to attempt anything bigger or better than Convair 160-ton bomber or the Northrop Flying Wing or the Convair 130-ton transport.

But potential production, in Great Britain and the United States of America, is likely to be concentrated upon the highest possible quality of aircraft and engines, a first line of defence which may deter dictatorship from taking the risk.

G. W. WILLIAMSON

TABLE I

SOME 650 M.P.H. JET AIRCRAFT

Name and Type	Span	Weight, lb.	Thrust, lb.	E.H.P.*	Thrust/ Weight Ratio
de Havilland 'Venom'	41′ 9″	? 12,000	5,000	9,000	0·41
Gloster 'Meteor'	37′ 2″	? 16,500	13,000	22,500	0·81
Hawker P.1052	36′ 6″	—	5,000	9,000	—
Vickers S.510	38′ 8″	—	5,000	9,000	—
Consolidated Vultee XF.92A	31′ 0″	13,600	4,600	8,400	0·35
MacDonnell XF.88 ('Voodoo')	39′ 8″	15,000	6,000	10,400	0·40
North American 'Sabre'	37′ 1″	13,715	5,000	9,000	0·36
Republic XF.91	30′ 0″	15,000	5,000	9,000	0·33
Sud-Ouest SO.6020	34′ 9″	17,637	5,000	9,000	—
Saab J.29	—	—	5,000	9,000	—

* *E.H.P. is Equivalent Horse-Power at* 650 *m.p.h.*

TABLE II

NIGHT OR "ALL-WEATHER" FIGHTERS

Make and Type	Span, ft.	Weight, lb.	Thrust, lb.	E.H.P.*	Thrust/ Span^2 †
Avro (Canada) C.F.100	52	—	13,000	17,300	4·8
de Havilland 'Venom'	38	—	5,000	6,600	3·5
Lockheed F.94	38	15,000	4,600	6,100	3·2
Northrop F.89, 'Scorpion'	55	30,000	10,000	13,300	3·3

* *E.H.P. is Equivalent Horse-Power at* 500 *m.p.h.*

† *As weights are not known, performance may be arbitrarily compared, for these four aircraft, by the ratio of thrust divided by the square of the span.*

TABLE III

LARGE BOMBERS, ALL-JET OR JET-ASSISTED, IN ORDER OF SIZE

Make and Type	Span, ft.	Weight, tons	E.H.P.*	Remarks
Consolidated Vultee ('Convair') B.36 ..	230	163	53,000	Maximum range, 10,000 miles. Maximum load 42 tons.
Northrop YB.49 ..	172	106	64,000	The "All-Wing" aircraft.
Boeing XB.47	116	63	48,000	The "Atom-Bomber." Speed over 600 m.p.h.
Consolidated Vultee XB.46	113	45	32,000	Speed 500+.
North American B.45 ('Tornado')	90	41	32,000	Speed 550+.
English Electric 'Canberra'	64	—	21,000	—
Martin XB.51	55	7	15,000	Maximum speed, 600 m.p.h.

* *E.H.P. is the Equivalent Horse-Power at* 550 *m.p.h.*

TABLE IV

LARGE MILITARY TRANSPORTS

Make and Type	Span, ft.	Weight, tons	E.H.P.	Maximum Load and Maximum* Range
Consolidated Vultee ('Convair') XC.99	230	132	18,000	50 tons; 8,000 m.
Douglas C.124.A	173	87	14,000	25 tons.
Boeing C.97.A	141	73	14,000	25 tons; 3,750 m.
Vickers 'Valetta'	89	18	4,110	5 tons.

* *Maximum range is stated for a military load much less than the maximum.*

TABLE V

SOME LARGE PROPELLER TURBINES

Make and Type	Shaft horse-power	Thrust, lb.	E.H.P.*	Weight, lb.	Pounds per H.P.
ARMSTRONG					
Mamba II	1,270	384	1,654	780	0·45
Double Mamba	2,540	770	3,310	2,000	0·60
Python	3,670	1,150	4,820	3,150	0·65
BRISTOL					
Theseus	2,220	825	3,045	2,205	0·73
Proteus	3,200	800	4,000	2,900	0·72
Coupled Proteus	6,400	1,600	8,000	8,106	1·00
NAPIER					
Naiad	1,500	241	1,741	1,100	0·65
Double Naiad	2,970	482	3,452	2,200	0·65
ROLLS					
Clyde	3,500	1,200	4,700	2,500	0·55
Dart	1,400	310	1,710	850	0·50
ALLISON					
T38	—	—	2,750	1,225	0·45
T40	—	—	5,500	3,000	0·55
TURBODYNE					
Model XT-37	—	—	10,000	—	—

* *E.H.P. is Total Equivalent Horse-Power at* 375 *m.p.h.*

TABLE VI

LARGE ALL-JET TURBINES

Name and Type	Thrust, lb.	E.H.P.	Weight, lb.	Weight/ H.P. Ratio
ROLLS-ROYCE				
Avon	6,500	11,300	2,400	0·21
Tay	6,500	11,300	2,000	0·18
Nene	5,000	8,700	1,550	0·18
DE HAVILLAND				
Ghost	5,000	8,700	2,011	0·23
AVRO (CANADA)				
Orenda	6,500	11,300	2,900	0·25
ALLISON (U.S.A.)				
J.33 (Model 400)	4,600	8,000	1,795	0·23
J.35 (Model 450)	5,000	8,700	2,260	0·28
GENERAL ELECTRIC (U.S.A.)				
J.47 (G.E.TG.190)	5,000	8,700	2,500	0·29
PRATT AND WHITNEY (U.S.A.)				
Turbo-Wasp,				
JT.6B (Nene)	5,000	8,700	1,723	0·20
J.48 (Tay)	6,500	11,300	2,000	0·17

* *E.H.P. is Equivalent Horse-Power at* 650 *m.p.h.*

CHAPTER XXVI

FOREIGN AIR FORCES

THE GENERAL tightening-up of security regulations concerning the equipment of air forces is not yet so severe—except in the Soviet Union—as to preclude a fairly comprehensive survey of material now in service. Of Soviet equipment very little is positively known, though much of a conjectural and imaginative nature has been written. In the present review only what is believed to be authentic information will be presented—in particular that which has been substantiated by pictorial evidence or eye-witness accounts.

U.S. AIR FORCE

At the time of writing the U.S.A.F. comprises 48 groups and 13 supporting squadrons, to which total can be added 27 groups, and other formations, of the Air Force Reserve and Air National Guard. Strength of groups and squadrons varies considerably according to duty; thus, a fighter group, of three squadrons, has an establishment of 75 aircraft, whereas a medium or heavy bomber group has 30.

FIGHTERS

In U.S.A.F. fighter squadrons replacement of piston-engined 'Mustang' and 'Thunderbolt' fighters with jet-propelled aircraft is nearly complete. It was reported in March this year that 19 jet-fighter groups were operational and that four National Guard groups were receiving deliveries of jets. Three types of single-seat jet fighter are in service, which (though differing appreciably in their characteristics) may be assessed, by current standards, as being fast and of relatively long endurance, but somewhat deficient in performance at height and rate of climb. It has been asserted that the climbing power of these machines is insufficient to enable them to intercept a bomber, even of the B-36 piston-engined type, flying at 40,000 ft., and it is for this reason that new intercepter fighters, profiting from the latest power-plant developments, are being fostered by the U.S.A.F.

Their defects notwithstanding, the three fighters named have much in their favour, and on September 15, 1948, the newest of them—the North American F-86 ('Sabre')—in standard service trim, raised the world's absolute speed record to 670 m.p.h.; this figure remains unbeaten at the time of writing. The Lockheed F-80 ('Shooting Star'), the basic design of which dates from 1944, is powered with an Allison J-33 radial-flow turbojet, with provision for water-alcohol injection. As on the F-84 and F-86, six 0·5-inch, M-3 Browning-type guns are concentrated in the nose (larger-calibre weapons are relatively little used in U.S. military aircraft), and two 1,000-lb. bombs can be carried at the wing-tips in place of drop-tanks.

The 'Thunderjet' is of later design, and is fitted with an Allison J-35A axial-flow turbojet. A notable characteristic of the "E" sub-type of this aircraft is the weight of rocket projectiles disposable under its wings. The maximum number of projectiles is 32, of 5-inch calibre; alternatively, twelve of these can be stowed in addition to two 11·75-inch 'Tiny Tim' rockets, each of 1,200 lb. There is no indication that either of these loads is yet regarded as normal, but experimental flights have been made, at an all-up weight of 24,000 lb., with a maximum R.P. load, wing-tip fuel tanks, and JATO assistance.

As already intimated, the North American F-86A, now well established in squadron service, is the fastest operational aircraft in the world. The thin, slotted wing is swept back at 35 degrees, and this fact necessitates—from considerations of c.g. position—the fitting of drop-tanks inboard, instead of at the wing tips. In conformity with normal American fighter practice, the flying controls have hydraulic boost.

Counterparts of the R.A.F. 'Mosquito' night fighter, the North American F-61 ('Black Widow') and North American F-82 ('Twin Mustang') continue in service, but will give way to new jet-propelled "24-hour" fighters, the first of which is the Lockheed F-94. This machine—a development of the F-80 'Shooting Star'—is undeniably an interim type, as is the British D.H.113; even so, it should prove of the greatest value in preparing the way for later twin-jet types designed specifically as all-weather fighters and of higher performance, as exemplified by the Northrop F-89 'Scorpion,' of over 30,000 lb. gross weight. An additional crew-man and night-fighter radar (even though this is of a special lightweight type) is a very heavy load for such a small aircraft as the F-94, and it is hardly surprising to learn that the J-48 turbojet (American-built Rolls-Royce Tay), with afterburner, has been adopted with a view to improving the rate of climb.

BOMBERS

Although seven or more jet-bomber prototypes have been flown in the U.S.A., only one type is in regular operation. This is the North American B-45 'Tornado,' which replaces the Douglas B-26 and has been compared with the English Electric 'Canberra,' though it is of lower performance and greater bomb capacity (20,000 lb.). Every effort is being made to extend the radius of action of the 'Tornado,' now generally quoted as "more than 800 miles."

Its gross weight of 83,000 lb. notwithstanding, the B-45 is classified as a light bomber, the "mediums" of the U.S.A.F. being the 120,000-lb. Boeing B-29 'Superfortress' and a derivative type, the 164,000-lb. B-50. Powered with four Wasp Major 36-cylinder engines, each delivering 3,500 h.p. for take-off, the B-50 is armed with fifteen 0·5-inch guns, cruises at over 300 m.p.h., and, carrying a 20,000-lb. bomb load, has a range of approximately 6,000 miles. This range is achieved without recourse to flight refuelling (for which provision is made), but with two external under-wing tanks. A standard B-50, the Lucky Lady II, has made the first non-stop, round-the-world flight with three air refuellings, during the period February 26–March 2, 1949.

The only "heavy" bomber in service (and, for that matter, in production) for the U.S.A.F. is the 358,000-lb. Consolidated-Vultee B-36. This "big-stick," as it has been dubbed, is as large as and heavier than the

Bristol 'Brabazon' air liner, and in its newest forms has four underslung J-47 turbojets, each of 5,200 lb. thrust, to augment the total of 21,000 h.p. delivered by six Wasp Major piston engines driving pusher propellers. A typical armament comprises sixteen 20-mm. guns in retractable barbettes. The B-36 is capable of speeds of over 400 m.p.h. and at levels above 40,000 ft. it has demonstrated its ability to outmanœuvre heavily loaded jet fighters.

The original specification called for a bomb load of 10,000 lb. and a range of 10,000 miles, but for short ranges a bomb load of 84,000 lb. is possible. One of the earlier B-36s, without turbojets, is claimed to have flown 10,500 miles without refuelling and to have released 10,000 lb. of bombs at the half-way point. A similar machine made a trip of 7,100 miles, of which 6,000 were flown at a height of over 40,000 ft. The average speed on this occasion was 300 m.p.h.

A total of 217 B-36s has been ordered and the reported intention is to develop versions capable of speeds in the region of 500 m.p.h. and having an operational ceiling of about 50,000 ft.

RECONNAISSANCE

For short-range reconnaissance the U.S.A.F. is largely dependent on the RF-80 variant of the jet-propelled 'Shooting Star,' but in the strategic reconnaissance role has standardised on the RB-36, RB-45, RB-29, and RB-50—all variants of bombers to which reference has been made. Thirty RB-36s will form the equipment of the 9th Strategic Reconnaissance Group.

TRANSPORT

Though the transport force of the U.S.A.F. includes at least nine types—a fact which has been severely criticised—it consists principally of Douglas C-47 Dakotas and C-54 Skymasters (which rendered exemplary service on the Berlin Air Lift) and Fairchild C-82 and C-119 'Packets.' The 'Packet' is of highly individual twin-engined, twin-boom design with a high-capacity central fuselage having excellent rear-loading facilities.

TRAINERS

Still largely of basically war-time design, trainers nevertheless include a quantity of new Lockheed T-33 dual-control adaptations which bear the same relationship to the 'Shooting Star' fighter as does the 'Meteor 7' to its R.A.F. fighter counterparts.

U.S. NAVY

A substantial contraction in established strength, with a reduction of carrier groups from fourteen to nine, is being largely offset in U.S. Naval Aviation by an emphasis on quality. In order that the Service may be ready for expansion, however, contracts have been placed for relatively small batches of new-type aircraft for service test. A reduction of marine air arm strength from 23 to 12 fighter squadrons has been announced.

FIGHTERS

Quantities of versatile, piston-engined Chance Vought 'Corsair' and Grumman 'Bearcat' single-seat fighters continue to give good service, but the U.S. Navy has shown the way in introducing carrier-based jet-fighter squadrons into regular service. Certain criticisms of U.S.A.F. jet fighters are not so justly applied to these newer types of naval fighters, which, having a lower wing-loading, in keeping with their carrier-borne status, are generally endowed with more tractable handling qualities at altitude. Single-seater jet types at present in service are the North American FJ-1 'Fury,' McDonnell FH-1 'Phantom' and F2H 'Banshee,' and Grumman F9F 'Panther.' A small quantity of Chance Vought F6U 'Pirates' is also being delivered. Of these five types, the single-jet 'Panther' and twin-jet 'Banshee' are the newest and most efficient, and both appear amenable to considerable development. The power unit intended for the 'Panther' is the Pratt and Whitney-built J-48 (Tay) delivering, with afterburner, some 8,000 lb. thrust.

Installations have been made in Navy fighters of 0·5-inch, 0·6-inch, and 20-mm. guns, and considerable research has been undertaken with a view to improving endurance and range. For the single-jet 'Fury' a range of over 1,500 miles has been claimed.

For night and all-weather fighting, standard single-seaters have been ingeniously adapted, though they obviously leave much to be desired. The first carrier-borne, jet-propelled two-seater specifically designed for this work is, in fact, the Douglas F3D 'Skyknight.' Though in its present relatively low-powered form the 'Skyknight' is inferior to single-seater jets in speed and climb, it is said to have a range comparable with, if not superior to, the best of these. The crew of two are disposed side by side, and the A.I. radar is reported to have a range of some 20 miles.

STRIKE AIRCRAFT

Although the war-time Grumman 'Avenger' has not wholly disappeared, the principal strike aircraft in service are the Douglas AD ('Skyraider') and Martin AM ('Mauler'), of which the former is by far the more widely employed. Having a gross weight of some 16,000 lb., the 'Skyraider' carries offensive loads of 1,000–6,000 lb. External stowage is provided for bombs, torpedoes, or rocket projectiles, including 1,200-lb. "Tiny Tims" of 11·75-inch calibre. Variants in use, or on order, are suitable for dive-bombing, rocket, or torpedo work, reconnaissance, radar counter-measures, meteorological duties, or (a most interesting departure) airborne early-warning, for which purpose radar of a very advanced type is installed. Specifically for anti-submarine operation, "hunter" and "killer" versions of the Grumman AF Guardian have been adopted. An advanced type of long-range, high-speed, carrier-borne strike aircraft is the North American AJ-1, of some 55,000 lb. all-up weight and able to carry an atom bomb. There is a pressure cabin for the crew of three.

PATROL AIRCRAFT

Most widely employed of the shore-based "patrol" aircraft, suitable for anti-shipping reconnaissance and, especially, for detecting and destroying submarines, the Lockheed P2V 'Neptune' is a twin-engined machine of the type which set up a world's long-distance record with a flight of 11,235 miles. Although, as already intimated, the 'Neptune' is officially classified as "shore-based," rocket-assisted take-offs have been successfully made from a carrier's deck. On one occasion a 'Neptune,' thus launched, flew 2,000 miles, released 10,000 lb. of bombs and continued for a similar distance. Provision is made for sonobuoys, 12×325 lb. depth charges, torpedoes, mines, rocket projectiles (including "Tiny Tims"), or any of the following bomb loads: 16×500 lb., 8×1,000 lb., or 4×2,000 lb. The fixed nose armament is six 20 mm. guns; there is a 2×0·5-inch dorsal turret and two additional 20-mm. guns in the tail.

A small quantity of Martin P4M 'Mercators' has been procured for generally similar duties; this type—somewhat larger than the Neptune—has two piston engines and two turbo-jets, the latter to assist take-off and for combat or emergency use, e.g. for closing on or retiring from a target. In the Martin 'Mariner' twin-engined amphibian the U.S. Navy has another very useful "patrol" machine. A small number of Goodyear airships are also available and for refuelling, rearming, etc., are able to base themselves on aircraft carriers.

FLYING BOATS

In addition to landplane transports of "Skymaster' and 'Dakota' types, the U.S. Navy employs Martin 'Mars' flying-boats of 200 ft. span. Helicopters are extensively used, and are under active development, for a wide variety of tasks, notably air/sea and arctic rescue.

U.S.S.R.

FIGHTERS

Typical of the piston-engined fighters which continue to serve the Soviet Air Force in large quantities, is the La-11, a specimen of which crash-landed near Tullinge, in Sweden, during May 1948. This type is a very compact radial-engined single-seater, of metal construction, bearing certain points of resemblance to the Fw190 and Hawker Fury and armed with three synchronised guns, probably of 20-mm. calibre, mounted in the fuselage. Little can be usefully said of performance beyond surmising that the top speed should be in excess of 400 m.p.h.

Earlier piston-engined types which remain in service include the Yak-3 and Yak-9, powered by Hispano-Suiza-type liquid-cooled engines of Russian manufacture, and having a performance considerably inferior to that of the later marks of Spitfire. Typical armament on these machines is one 20-mm. gun firing through the airscrew hub and two 12·7-mm. synchronised guns mounted above the engine.

Certain characteristics of the Yak piston-engined fighters are discernible in one of the first jet fighters to go into service with the Soviet Air Force. Known as the Yak-15, this type is characterised by a single axial-flow jet unit mounted beneath the fuselage and discharging almost in line with the trailing edge of the wing. The pilot's cockpit likewise coincides with the trailing edge and his field of view must be much inferior to that obtainable from current British and American jet fighters. The span of this somewhat elementary type of jet fighter is probably less than 35 ft., and it is unlikely that the maximum speed is much in excess of 500 m.p.h.

A heavier and altogether, it would seem, more efficient jet fighter is the Mig-9. This type is characterised by a nose intake for twin underslung, axial-flow turbojets which, as in the Yak-15, are basically of German conception. The cockpit is located fairly well forward in the nose and the fuselage is largely triangular in section. The undercarriage is of nose-wheel type. A maximum speed in excess of 560 m.p.h does not seem an unreasonable estimate for this fighter.

A third jet fighter, possibly designed by Yakovlev, bears a certain resemblance to the American Republic 'Thunderjet' in having a "straight-through" ducting system and square-cut wings of moderate taper.

So far as is known, the fastest Russian fighter is a single-jet type of unknown designation which made its first appearance, in squadron service, in the Moscow Air Display of 1949. The type of power unit installed is not known, but assuming it to give 4,500–5,000 lb. thrust, such as might be delivered by a Nene-type turbojet, as available in Russia, a maximum speed in excess of 650 m.p.h. should be attainable. Certainly the sharply swept-back wing and tail surfaces of this fighter suggest a very high Mach number. The air intake is in the nose of the fuselage and the outlet in the extreme tail. Except in having a very high-set tailplane, the machine bears an overall resemblance to the North American F-86 'Sabre,' to which reference has been made.

No evidence has been forthcoming of any Soviet night and all-weather fighter of the class now being sponsored by the British and American Services, though a version of the Pe-2 twin-engined dive-bomber (a piston-engined machine of war-time vintage, much inferior in performance to the 'Mosquito') has been employed in the long-range fighter role.

It is known that the Russians have displayed great interest in a development of the German rocket-propelled Me163 target-defence intercepter, a type which possesses exceptional climbing powers but is restricted to an endurance of only a few minutes. There is no evidence, however, that such a type is in service.

LOW-FLYING ATTACK

The technique of the low-flying attack is one which the Soviet Air Force has developed to a high pitch, and large quantities of Ilyushin Il-2 single-engined two-seater monoplanes are utilised for this purpose. The type is of very robust construction, and there is extensive armouring of the engine, cockpit, and radiator system. Various combinations of fixed guns are installed in the leading edge, and twin 12·7-mm. or 20-mm. guns are commonly mounted in the dorsal position. Internal provision is made for a bomb load of about a ton, alternative to banks of rocket projectiles beneath the outer wings. It is unlikely that speed exceeds 300 m.p.h., although a 12-cylinder liquid-cooled engine of some 2,000 h.p. is installed.

BOMBERS

The Pe-2 dive-bomber, to which reference has already been made, is a low-wing monoplane with two Hispano-Suiza-type liquid-cooled engines.

Slatted dive-brakes, somewhat similar to those on the German Ju-88, are installed outboard of the engine nacelles, and a typical bomb load—externally stowed—is 2,200 lb. Two fixed rifle-bore guns fire forward from the nose; there is a 12·7-mm. gun in a manually operated dorsal turret, and a similar gun in a ventral tunnel position. For level bombing there is a sighting station in the nose.

Somewhat similar in appearance to the Pe-2, but more powerful and generally more efficient, is the Tu-2, a mid-wing monoplane of some 25,000 lb. gross weight, powered with two ASH 82 14-cylinder radial engines of 1,800-2,000 h.p. and having a maximum speed approaching 350 m.p.h. at 20,000 ft. The bomb load of this machine is more than double that of the Pe-2, and the armament comprises two fixed 20-mm. forward-firing guns, a ventral 12·7 mm. gun, and two guns of the same calibre in dorsal positions. A crew of three or four is normal.

The post-war strategic bomber squadrons of the Soviet Air Force are equipped with a version of the Boeing B-29 Superfortress bomber: thus, three Powers—America, Britain, and the U.S.S.R.—are similarly equipped in this respect. The history of the Soviet-built B-29s probably dates back to 1944, when three American aircraft of this type were forced to land in Siberia after bombing raids on Japan. A fourth is known to have crashed on Siberian soil. In 1947 there were included in the Soviet Aviation Day parade at Tushino, Moscow, a number of B-29-type bombers, stated by General Spaatz to be "definitely more than the Russians came by from us," so evidently the type was in production. General Spaatz also disclosed, in testimony before President Truman's Air Policy Commission, that in 1946 Russia had tried—unsuccessfully—to place an order with an American company for tyres, wheels, and brake assemblies for the B-29. In recent months many dozens of Soviet B-29-type bombers, for which the designation Tu-4 has been reported, have been identified. Production rate is probably high, but to what extent the Russians have been able to copy the elaborate fire-control system and other services which characterise this type of aircraft is not known. Certainly the effectiveness of the B-29 stems largely from its ability to operate at high altitudes, for which pressurising is essential, and from its heavy armament—in the American version, thirteen 0·5-in. guns in remotely controlled and electrically operated barbettes. The maximum bomb load of the standard B-29 is 20,000 lb. Without question the Russian copy must be much inferior to the latest American Superfortress development, the B-50, which takes advantage of new constructional techniques and the greater power afforded by the 36-cylinder Pratt and Whitney Wasp Major engines.

Although no Russian jet bombers have been identified in service, at least one prototype has been seen. This is a twin-jet type, probably designed by Tupolev, and bearing a marked resemblance to the piston-engined Tu-2 already described. The turbojets are installed in long underslung nacelles, and gun positions are in evidence. It is most improbable, however, that this type approaches in effectiveness either the British 'Canberra' or the U.S.A.F.'s North American 'Tornado.'

There have also been reports of a four-jet bomber prototype, in which the turbojets are mounted well outboard, beneath the wing. On the evidence advanced this machine could hardly approach the performance of the American six-jet Boeing B-47.

TRANSPORT

Russian transport squadrons are principally equipped with Li-2 and Il-12 twin-engined monoplanes. The Li-2 is the Russian version of the 'Dakota' and is commonly powered with single-row M-62 engines. Armament is occasionally installed. The Il-12 is of totally original design. A civil version is widely employed in addition to the military model, and a specimen, operated by the Czechoslovak State Airlines, has already been examined in this country. The nosewheel undercarriage has duplicated main wheels. Two ASH 82 FN two-row radial engines, each of about 1,650 h.p., are installed, and drive four-blade metal airscrews. The wing has thermal de-icing, and adjustable seats are provided for 28–32 passengers. Empty and loaded weights are, respectively, 24,500 and 38,000 lb., and the economical cruising speed about 210 m.p.h.

A larger four-engined machine, along somewhat similar lines, is the Il-18, capable of carrying 66 passengers or a greater number of troops. With engines similar to those in the Il-12, this type could hardly be expected to attain a maximum speed of more than 300 m.p.h. A generally superior machine is the Tu-70, the transport variant of the Russian B-29 bomber, capable of carrying over 70 passengers and having a longer range than the Il-18.

TRAINERS

In training units the Po-2 radial-engined biplane continues to serve in very large quantities, but monoplanes—notably the Yak-11 and Yak-18—are also available. The Yak-18 is a relatively new machine with a 160-h.p. M-11RF five-cylinder radial engine and capable of nearly 160 m.p.h. Equipment includes blind-flying instruments and radio.

FRANCE

An unstated number of de Havilland 'Vampires' (mainly Mk.5 fighter-bombers, with Goblin 2 turbojet) have been delivered to France, and licences have been granted for the construction of the 'Vampire' airframe. French-built 'Vampires' may be fitted with the Rolls-Royce Nene turbojet and may take advantage of the new Hawker-type air intake developed by Boulton Paul. Other fighters in service with the Armée de l'Air are Republic 'Thunderbolts,' 'Spitfire' 9s, 'Mosquito' 6s and 16s, 'Halifax' 6s, and 'Mustangs.' Transports include 'Dakotas,' Ju52s, and Marcel Dassault M.D.315s.

French Naval Aviation (l'Aeronautique Navale) operates two British-built aircraft carriers, the Arromanches and Dixmude, and is equipped with Supermarine 'Seafire' and Grumman 'Hellcat' fighters, and Curtiss 'Helldiver' and Douglas 'Dauntless' dive-bombers. Flying-boat types, other than Short 'Sunderlands' supplied by Great Britain, are Breguet 730s and Dornier Do24s.

BELGIUM

The newest types in service with the Belgian Air Force are Gloster 'Meteor 4' jet intercepters and 'Meteor 7' dual-control trainers. In fighter squadrons, however, Spitfires still predominate. The standard bomber is the 'Mosquito 16' and miscellaneous types include 'Dakota' transports, 'Auster' A.O.Ps., 'Oxfords,' 'Harvards,' and Stampe S.V.4b and 'Tiger Moth' biplane trainers.

HOLLAND

The Netherlands Army Air Force has been supplied with Gloster 'Meteor 4' intercepters and 'Meteor 7' trainers (Rolls-Royce Derwent turbojets). Piston-engined types in service are 'Spitfires' (Mks. 9 and 19), 'Mitchells,' 'Mustangs,' 'Dakotas,' 'Austers,' 'Ansons,' 'Oxfords,' 'Harvards,' and a number of new Fokker 'Instructor' primary trainers. The 'Instructor' is a post-war product of the Fokker concern, which is now preparing to build Gloster 'Meteor 8s' for the Dutch and Belgian Air Forces. Also in production at the Fokker works are Hawker 'Sea Furies' for the Royal Netherlands Naval Air Service.

The Naval Air Service is already using British-built 'Sea Furies,' together with Fairey 'Firefly' 1s and 4s, 'Mitchells,' 'Catalinas' and 'Dakotas.' Fairey Operational Trainers are also in regular service.

SWEDEN

De Havilland 'Vampire' jet fighters supplied to the Swedish Royal Air Force are Mk. 1s (Goblin 2) and Mk. 50s (Swedish-built Goblin 3). In Swedish service these types are known respectively as the J-28A and J-28B. Another jet type likewise employed for fighting and attack is the Saab 21R (J-21R), powered either with the D.H. Goblin 2 or Svensk Flygmotor Goblin 3, and developed from the J-21A piston-engined fighter. The 'Vampire' and Saab jet squadrons constitute a highly effective fighter-bomber force, but a much more advanced jet fighter, the Saab J-29, is already in quantity production. The J-29 has a Ghost turbojet, swept-back wing and tail surfaces, and a top speed far in excess of 600 m.p.h.

Piston-engined types, additional to the J-21A, are the North American 'Mustang' and de Havilland 'Mosquito' night-fighter. Variants of the Saab 18 are used for bombing, attack, and reconnaissance. Typically, the Saab 18 has Swedish-built Daimler-Benz D.B.605 liquid-cooled engines, and attains a speed of over 350 m.p.h. 'Spitfire 19s' for high-altitude, long-range reconnaissance, are also on hand, and miscellaneous types in service include Harvards, Ju86s, Do24s, D.H. 'Doves,' 'Catalinas,' and Saab 'Safirs.'

DENMARK

Spitfires in service with the Danish Air Forces are being supplemented by 'Meteor 4' jet intercepters. For reconnaissance and air/sea rescue Supermarine 'Sea Otters' and Consolidated-Vultee 'Catalinas' are available. Trainers include 'Oxfords,' 'Harvards,' and K.Z.IIs. The last-named type is a Danish-built primary trainer.

ITALY

Various sub-types of de Havilland 'Vampire' have been supplied to Italy, and a licence has been granted for the manufacture of "de Havilland fighter aircraft and engines." In addition to the 'Vampires,' the Italian Air Force uses 'Spitfire 9s,' 'Mustangs,' and Fiat G.46s, as well as a miscellany of transports and trainers.

SWITZERLAND

Seventy-five de Havilland 'Vampire' Mk. 6 fighter-bombers, with Goblin 3 turbojet, have been supplied to the Swiss Air Force, in addition to four 'Vampire 1s.' A licence to build the 'Vampire' airframe has also been granted. These jet aircraft constitute the core of the Swiss Air Force, but some North American 'Mustangs' and Swiss-built 'Federal Factory' general-purpose bomber-reconnaissance aircraft are also used. Numbered among the trainers are German Bückers and Messerschmitts, and Swiss-built Pilatus P-2s.

NORWAY

Orders have been placed for an unstated quantity of 'Vampires' (Mks. 3 and 52) for the use of the Royal Norwegian Air Force. 'Spitfire 9s' and 'Mosquito 6s' are used as fighter/attack aircraft, and 'Catalinas' are available for patrol and air/sea rescue duties.

ARGENTINA

A substantial quantity of Gloster 'Meteor 4s' (Rolls-Royce Derwent) forms the nucleus of the Argentine Air Force's fighter strength. These jet fighters are almost identical with those in R.A.F. service and are supplemented by a small number of Fiat G.55 fighters with Fiat R.A.1050 liquid-cooled engine, and—mainly for ground-attack work—machines of the I.Ae.24 'Calquin' type. The 'Calquin' is a two-seater and bears a marked resemblance to the de Havilland 'Mosquito,' similarly employing a wooden "sandwich" form of construction. It is fitted with American Pratt and Whitney Twin Wasp radial engines, has stowage for some 1,700 lb. of bombs and mounts four 20-mm. fixed guns. Provision is made for rocket projectiles. A small number of Avro 'Lincoln' heavy bombers, with four Rolls-Royce Merlin engines, and almost identical with R.A.F. 'Lincolns,' has been supplied, and the Bristol Type 170 Freighter and Percival 'Prentice' basic trainer are among British types in use. For advanced training the Argentine-built D.L.22 has been adopted; a two-seater, on Harvard lines but of wooden construction, it has the 450-h.p. El Gaucho engine.

The Argentine Naval Air Service possesses, among other types, Consolidated 'Catalina' twin-engined flying-boats and Grumman amphibians.

CZECHOSLOVAKIA

Versions of the German Me 109 and Russian La-7 piston-engined fighters and Pe-2 twin-engined dive-bomber, with a quantity of Ju52 three-engined transports—all obsolescent types—form the principal equipment of the Czechoslovak Air Force.

EGYPT

'Spitfire 9s' are supported by Italian-built Fiat G.55 and Macchi C.205 fighter-bombers. 'Dakotas,' 'Doves,' and 'Commandos' are standard transport aircraft, and trainers include 'Ansons' and 'Harvards.'

TURKEY

The Turkish Air Force uses three marks of 'Spitfire' (5, 9, and 19), Republic 'Thunderbolts,' de Havilland 'Mosquitoes,' and Douglas 'Invaders.' 'Dakotas' equip the transport units and for training, 'Harvards' and Beech AT-11s are available.

IRAN

Additional to a few Hawker 'Hurricanes,' the Imperial Iranian Air Force possesses some Republic 'Thunderbolts,' Avro 'Ansons,' and 'Tiger Moths.'

IRAQ

The most effective first-line type in the Royal Iraqi Air Force is the Hawker 'Fury-Baghdad' fighter-bomber-reconnaissance machine. 'Tiger moths' and 'Ansons' are used for training.

H. F. King

CHAPTER XXVII

MANNING THE ROYAL AIR FORCE

THE PROBLEM

MANNING THE Royal Air Force since the war ended has been complicated by the reaction among young men against Service life and by the heavy civilian demand for labour of the kind needed by the Service. Standards of intelligence and qualifications could not be lowered, yet the very qualities sought by the Air Force were being offered attractive opportunities outside. The institution of national service made the officer and skilled tradesmen classes of still greater importance. Whereas the pre-war Air Force was designed as a highly skilled regular force capable of swift expansion, modern conditions have compelled the use of a large body of semi-skilled men continuously under training. Before the war there were roughly 100,000 Regulars; today there are perhaps 125,000.

The proportion of national servicemen to Regulars at present is about three to five. As national servicemen, serving for 18 months, cannot be turned into skilled tradesmen without devoting the whole of their service to training, the R.A.F. finds itself with a large supply of manpower but a disproportionately small supply of the skilled labour on which it must depend for operational strength. On the recruiting side, it finds itself also in the difficulty of having to make its appeal in the main to youths who know they have compulsory service ahead of them and are disposed to wait and see what the Service is like before committing themselves to five or eight years in it.

THE AIM

In these circumstances the R.A.F. has applied itself to two broad aims. It has sought to make the best possible use of the national servicemen without incurring undue expense in training them; and it has tried, by organising Service life as a progressive career up to the age of 50 or 55, to make regular engagement attractive to men who would otherwise prefer to look for advancement in civilian occupations. The two aims interlock to a large extent. If the second objective is attained, many national servicemen can be expected to change their compulsory service for voluntary engagement, and the way for them to make this change is eased by offering them the chance to engage for three years, reckoned either from the date of beginning national service or from the date of entering into the Regular engagement, as they please.

This view that the best recruiting time is while a man is in the Service has been encouraged by the high quality of many of the national service entrants. Although the R.A.F. receives about 1,000 national service entrants a week, it is still able to make its selection. More youths offer themselves for the R.A.F. than are taken, and the Service is able to choose those most suited in education and physical qualities for its purposes. From among them it selects about 300 each year for training as pilots and many others for commissioning in ground branches after only six months' training. Every effort is made to link the civil and Service jobs of national servicemen by putting them into R.A.F. trades approximating to those which they followed in civil life. Where this is not possible they are taught a new trade. At present about one half of the national service entrants receive trade training in R.A.F. schools and the other half are taught while they are engaged on the job under supervision.

An ingenious idea of personal reliefs has been introduced into this system of training on the job. When the new entrant has finished his brief disciplinary training, he is posted to a unit and, whenever possible, is introduced to the national serviceman whose place and job he is to inherit. He is told that this man is due to leave the Service on a certain date; is put under the wing of the departing aircraftman; and is warned that the job will rest on his shoulders when the older hand leaves. An element of personal responsibility and stimulation is introduced in this way, and the recruit usually rises to the occasion. The disadvantage is that the method involves a certain lack of mobility because the individual normally stays at the same station and in the same job throughout his short service, but it has the merit of saving heavy expenditure on training establishments.

If the individual happens to have been sent to one of the newer stations, it may induce him to choose the Service as his career. The importance of quarters has been appreciated by the R.A.F. from the start. Long ago, Lord Trenchard as Chief of Air Staff earned for himself the satirical title of "G.O.C. Ground Forces," and he has since advised the Service not to "subordinate life to mechanism." But the R.A.F. is still obliged to use many hutted camps where comfort and convenience are of a low order. It is still short, like the rest of the country, of married quarters. Worse still, it is suspected by the average citizen of not paying what is called the "rate for the job"—a rate corresponding to that which a tradesman of similar skill could expect to get in civilian employment.

Some 150 trades are comprised in the R.A.F. and these are arranged in four groups with different rates of pay for each group. Striking an exact balance between Service and civilian rates is consequently a difficult progress. The Air Ministry claims, in broad terms, that it pays the "rate for the job" less £1 a week in respect of quarters and food, and it points out that the airman.has a further benefit in reduced insurance contribution and in having nothing to pay for travelling to and from his work. In the majority of trades the claim is probably just, although some of the radar tradesmen are manifestly receiving less than they could earn as civilians in view of the current heavy demand for television technicians. The feeling that the Service does not pay as well as a civilian employer arises, no doubt, not so much from an examination of the rates as from an examination of the two sets of pay packets. In the Service there is no payment for overtime. In existing conditions of full employment, pay is obviously an important factor in attracting recruits. If the long view were taken and some assurance of advancement could be given the prospective recruit would have to regard the economic bargain as a good one. For example, the pension of a sergeant after 22 years' service can be taken on the average as representing an addition of 25*s*. a week to the pay he received during his service.

Not every recruit can count on becoming a sergeant, nor can every recruit be sure that he will be allowed to re-engage to complete 22 years for his pension. Re-engagement depends on his record and his proficiency. He therefore needs reassurance on two main counts. He wants to be sure that if, for any reason, he fails to re-engage between the ages of 22 and 30 he will still be able to sell his skill in the civilian labour market. He also wants to be reasonably sure of making financial headway if he spends the whole of his working life up to the age of 50 or 55 in the Service. On this count, he understands that only a certain proportion of tradesmen can expect to become N.C.O's. and that a still smaller number can look for commissions.

Up to the present, promotion was the only way for a skilled tradesman to get advancement. His trade board could grade him L.A.C., but unless he had the qualities of leadership and responsibility needed in an N.C.O. he could remain an L.A.C., no matter how high his skill or how wide his experience, for the rest of his Service life. The same risk of remaining a journeyman all his days may be said to face a man in civil life, but if he fails to become a charge-hand or foreman he may find other acknowledgements of his special skill through piecework or one of the bonus systems. The Service has lately recognised the desirability of providing within each trade a ladder other than of promotion to non-commissioned rank, and has under consideration a scheme which aims at starting each tradesman on a small and strictly circumscribed section of his trade and at presenting him with opportunities of qualifying in wider aspects of his trade at intervals throughout his career. At each step up the ladder he would receive a higher rate of pay. A scheme of this kind, if further investigation shows it to be practicable, would go far towards justifying the offer of a career to R.A.F. entrants.

The preparation of the plan showed at least the sincerity of the desire that men joining the R.A.F. shall find the life a good one and shall be disposed to stay in the Service. The other side of the Regular airman's concern as to prospects is also being tackled. The engineering trade unions have already agreed to accept R.A.F. trade qualifications as justifying the issue of a trade union ticket. Negotiations with other unions for similar arrangements are also showing good promise. There begins to appear a good likelihood that a Service-trained tradesman will be able to ply his trade in civilian life if he should choose to leave the Service or should fail for some reason of health or other misfortune to re-engage for a second or third period of service.

RELATIONS WITH INDUSTRY

Youths planning their lives at the outset are not, of course, the only source of manpower for the R.A.F. Regular airmen are recruited between the ages of 17½ and 33. Nor does the Service want to have its manpower on long-term engagements. A reasonable body of well-trained and skilled reservists, over and above the less highly trained national servicemen on the reserve, is desirable if expansion of the Service in time of trouble is to be balanced and swiftly effective. It looks, therefore, to industry to encourage those skilled men who are so disposed to give a few years of their lives to the service of the country. Some employers have received the idea sympathetically, and the Service hopes that others will join in easing the way for a man to volunteer.

At first sight the proposal looks quite revolutionary. What the Service has proposed to employers is that they should agree to release for a period of three or five years such men as would like to join the R.A.F., and should undertake to reinstate them at the end of their service in the positions they would have been likely to attain if they had remained in their civilian employment during those five years. The request in effect is that industry should share its manpower with the nation's first line of defence, taking care not to penalise economically those men who are willing to do this patriotic duty. The open-minded employers have not been so astonished at the request as might have been expected.

Some industries can look for a direct advantage from such a sharing of labour. These are industries producing equipment used by air forces. They can expect their tradesmen to come back after three or five years with useful knowledge of how the firm's products meet the requirements of the Service and perhaps with valuable ideas for improving them or the methods by which they are manufactured. Industries which have no direct association with the Service are beginning to believe that variety of trade experience and a taste of Service life may improve the quality of those employees who have the spirit to offer themselves. The experiment at all events is being tried, and as the R.A.F. is steadily improving its contact with industry it may grow in scope to the benefit of both parties.

Relations between the Service and both sides of industry were put on a much better footing by the three-day conference given the title "Exercise Ariel," held in May 1949. This was virtually a staff exercise in a basic aspect of manning, in which employers, trade union organisers, representatives of the professions and of learned societies, and labour experts were invited to share. Senior officers of the R.A.F. laid the difficulties of the manning situation frankly before the conference and invited the civilian members to suggest ways of resolving them. A number of helpful ideas were put forward at the conference. Still more were submitted in memorandum form after the conference and in the months that followed, the whole product of Exercise Ariel was analysed by the Air Ministry and every useful suggestion was pursued. Some of the results of this ingenious staff exercise, organised by Lord Tedder, are already to be seen in plans for improving the conditions of service. Some will declare themselves less obviously through the closer contact between the Service and industry. Some will doubtless emerge from the better understanding which industry and organised labour gained of the way in which the Service seeks to perform its dual task of maintaining an efficient first line and of preparing a force capable of rapid expansion.

PLANNING

How big the task has been in the post-war years was made clear at that conference. During the war the strength of the R.A.F. stood at about a million. Its peace-time strength has been set at something like 200,000. Demobilisation, in accordance with the promises of statesmen, drained away nearly the whole of the R.A.F.'s skilled labour and left the Service with the job of building it again practically from nothing. The mistake of stopping Regular recruiting during the war can be seen clearly enough now, as can also the foolishness of the drastic curtailment of flying training activities immediately after the war. Ground was lost in those years which is extremely hard to recover. An attempt is being made to ensure against erring in ignorance of the consequences in future.

A planning department has been formed in the Directorate General of Manning to analyse every proposal for alterations in training, recruiting, and manning in the R.A.F. Its function is to forecast the effects of such changes so that the Air Council shall be fully informed as to the probable repercussions from any modification of existing practice. As a result of the short-sightedness in the war years and of the new system of national service, the R.A.F. has passed through a most awkward period. Even if the flow of Regular recruits had been as generous as it would have had to be to make good the wastage, the Service would probably have been unable to provide training facilities on an adequate scale. The manpower slump instead has been general.

It affected the apprentice schools, where a three years' course turns out embryo tradesmen in the airframes, engines, armaments, instruments, electrical, and radio trades. It was felt at the school for administrative apprentices, where the boys spend only 16 months. It reduced the number of boy entrants who are trained to become Group B or semi-skilled mechanics. It even slowed the flow into the R.A.F. College at Cranwell and therefore diminished the entry of officers holding permanent commissions in the executive general duties branch of the Service. At the same time there was competition for admittance to membership of the University air squadrons, increased since the war to 14 in number; but this gave no guarantee that the majority of the members would apply for commissions in the R.A.F.

THE FLYING BRANCH

On the flying side many of the same factors influenced recruiting as in the ground branches. The high standards of intelligence, education, and physical characteristics required of candidates for air crew (pilots, navigators, signallers, engineers, and a dwindling class of air gunners) have been fully maintained. Young men of the right type, considering the prospects and taking account of the risks of flying, tend to be more conscious than they once were of the chances available to them in civil life.

Cranwell cadets who satisfactorily complete their training and University entrants are guaranteed permanent commissions, and if they succeed in the Service they are assured of an attractive life career. But entrants from these sources fill only a proportion of the posts in the General Duties (flying) branch; the remaining posts are filled on a short-service basis either by officers holding short-service commissions as pilots or navigators for 8 years' active list service or by air crew pilots and navigators engaged for a similar period. The policy is that all pilots and navigators should hold commissioned rank, but in present circumstances the Service is obliged to retain provision for air crew pilots and navigators, as not all candidates coming forward have the characteristics required in an officer.

Candidates accepted for pilot and navigator training under the short-service scheme train as cadets to wings standard, becoming pilot or navigator IV on completing the basic stage of training, pilot or navigator III after 2 years' service, and pilot or navigator II after 4½ years' service. A number are pre-selected on entry, or selected during training, for commissions, and these receive their commissions on qualifying for wings after about 18 months' training and serve as officers for the balance of their 8 years' engagements. All pilot and navigator cadets are given officer cadet status at the end of the first 14 weeks of initial training and then receive officer training side by side with their flying training. All who are considered suitable for commissions at the end of applied training, i.e. on attaining wings, are given commissions. A proportion of short-service officers are selected for permanent commissions in the General Duties branch during their short service and others have opportunities for permanent commissions in ground branches. The uncertainties are no more pronouced than they are in civilian employment, except in respect of permanency. That cannot be altered because the Service must have reserves; but the chance of a permanent commission corresponds to the chance of swift advancement outside.

Selection for the General Duties branch rests, as in other Services, on a period of test and observation in which the selection board looks for initiative, enterprise, skill in handling men, and those other less tangible characteristics comprised in the desired quality of leadership. The air crew entrant, weighing his chances in the Service against the uncertainties of advancement in civil employment, is liable to allow financial considerations to tip the scale. He knows that the improved pay scales fixed for the R.A.F. in 1946 were largely offset by the Government ruling that marriage allowance should thenceforth be subject to income tax; that since 1946 the cost of living has risen; that married quarters are no more numerous for officers than for other ranks, and rents for private accommodation are often prohibitive; that postings compel an officer to send his children to a boarding school if their education is to be continuous; and that social life in the Service is apt to be expensive because of the remoteness of most R.A.F. stations from centres of population.

Few who have examined the R.A.F.'s situation in recent years have any doubt that the diminution in the entry of officer types can be explained on financial grounds. Among officers already in the Service the taxing of allowances is a genuine and understandable grievance. When the gross incomes of officers are examined they appear reasonably good, yet the persistence of complaint from junior serving officers suggests that some adjustment, as in other professions, is indicated by experience to be desirable.

Doubling the period of the short-service commission does not appear to have so discouraging an influence as was feared. Before the war, the short-service officer did 5 years' regular service (including 1 years' training), but as the normal age for entry was between 21 and 22 he presented himself for civilian employment at the age of 26–27, when he went on the reserve. Experience showed that this was not too late for satisfactory resettlement. Nowadays the average age on entry is 18–19, so that with 8 years' service the age of resettlement will still be 26–27.

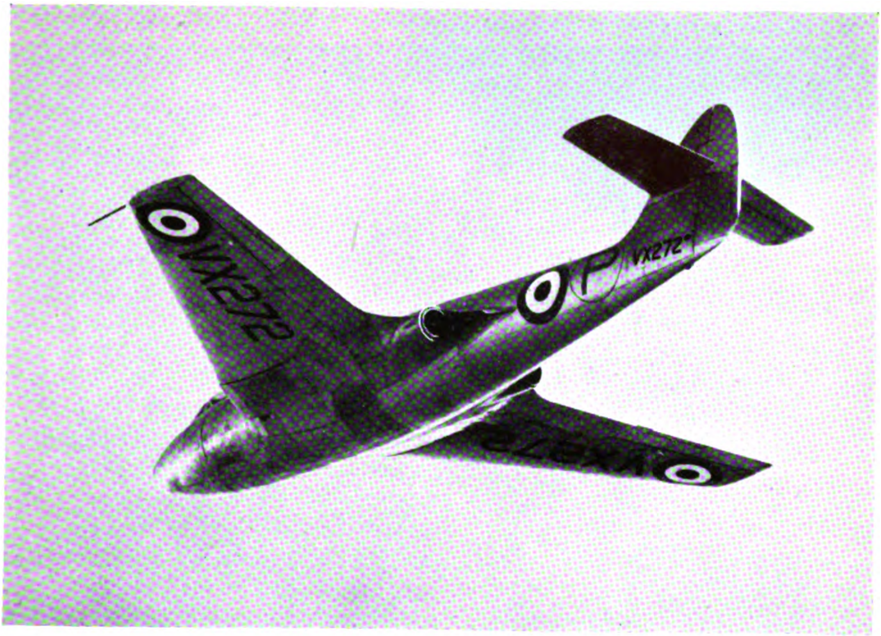
Much trouble is being taken by the Service to evoke the essential officer attributes in its officers and to develop them by training as well as experience. Among the courses is one dealing with what is called man-management. The General Duties officer of today is required to be much more than a good pilot or navigator. He is expected to take on his shoulders the responsibility for his men's welfare and comfort and to see that his unit is organised in such a way as to make willing and contented service contribute to efficiency. In other words, he becomes accustomed to dealing with men and experienced in the difficulties which arise in getting work done smoothly and efficiently. In the long run, this should secure the R.A.F. officer, whether of short or medium service, against the perils of unemployment when he leaves the Service; and the cachet of a commission in the Service should come to be regarded as an economic asset worth acquiring.

At the present stage, service in the R.A.F. may be inherently attractive and yet fail on economic grounds to hold its own against the prospects of civilian employment. There are hopes that through the air sections of the Combined Cadet Force units at public schools a fuller conception of the opportunities offered by commissioned service in the R.A.F. may be conveyed to the type of schoolboy likely to succeed in it. During the Easter holidays of 1950 some fifty public schoolmasters who were also officers in these air sections attended a four days' course including visits to the R.A.F. College at Cranwell and to representative stations in the principal R.A.F. commands. This is typical of the steps which are now being taken to afford a more intimate acquaintance with life and work in the Service to those who have most often to advise young men as to careers suitable to their talents, qualities, and temperaments.

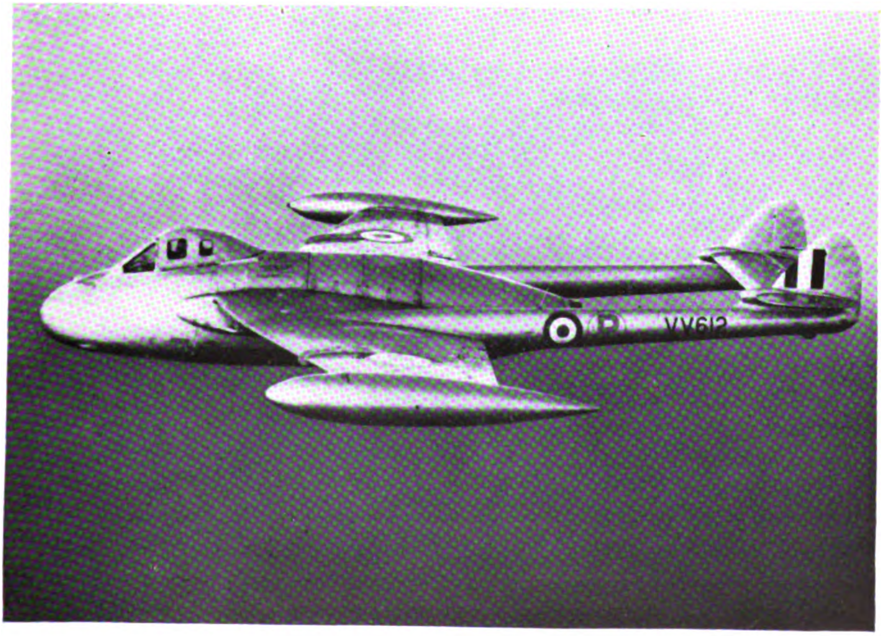
THE OTHER BRANCHES

Such initial financial drawbacks as effect the entry for air crew duties of recruits aiming at commissions in the general duties branch also operate in some measure in other branches. The technical branch, for instance, now offers good prospects of promotion. In this branch the intention is to find a large proportion of the officers needed from airmen in the Group A or skilled trades. Airmen in this group are drawn largely from the apprentice schools and a complete career from apprentice to air marshal is possible to boys who gain admittance as apprentices. That fact has perhaps still to make itself widely known to parents; or perhaps the modern inclination to look for quick material results deflects attention from it. At all events, the post-war entries in examinations for the apprentice schools have been smaller than in other years. Another source of officer supply for the technical branch exists in the universities and for this class a flying officer's basic pay of £274 a year probably compares not unfavourably with the salary a young graduate might expect to receive on joining an engineering firm.

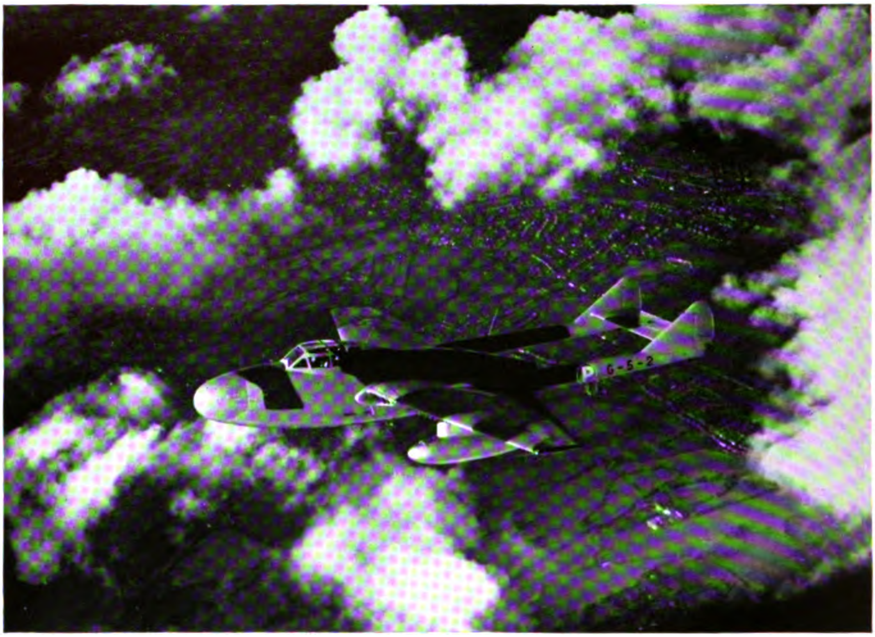
If, in fact, there are inequalities between Service and comparable civilian rates, these cannot be resolved by the Service itself. The State as paymaster may be slower than private enterprise to respond to the economic implications of supply and demand; but whatever the situation, the Service can and does resist any temptation to lower its officer standards. The R.A.F. is rebuilding its officer corps slowly and laboriously from some

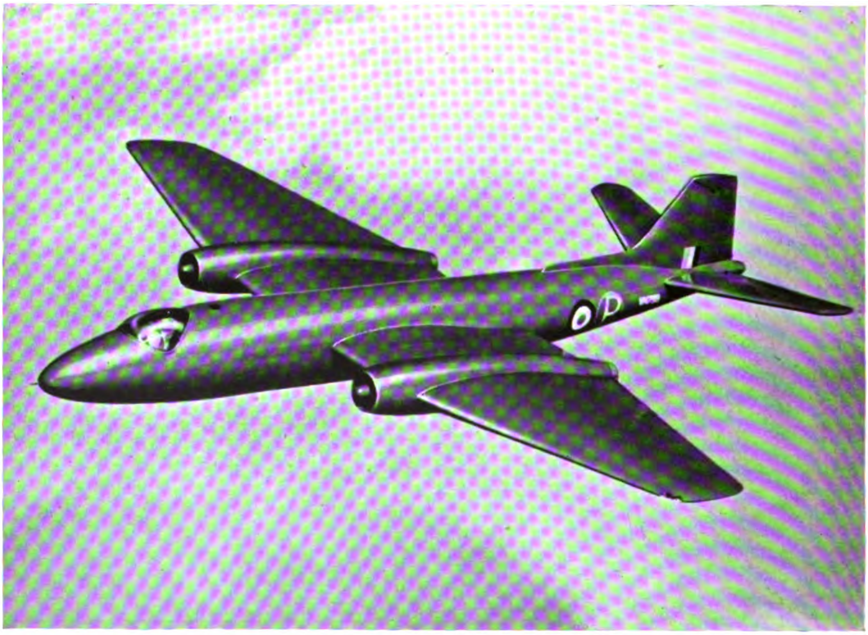


Hawker P.1052



De Havilland Venom





(*a*) De Haviland D.H. 113 Vampire Night Fighter
(*b*) English Electric Canberra Jet Bomber

of the finest human material in the country, and is gradually recovering, chiefly through the influence of its officers, that spirit of pride in the Service which expressed itself brilliantly in two wars.

THE WOMEN'S ROYAL AIR FORCE

Alongside the R.A.F. there now stands the W.R.A.F., no longer a separate force but a part of the Service. It is to be reckoned with henceforth in any plans for manning the Service, for most trades are now open to women and nearly every branch is open to women officers. Here the question of offering a career is a less essential influence in recruiting. Marriage and other feminine factors tend to shorten the average period of service. This need not always be so; or at least there will be exceptions to prove the rule, and men must expect in the future to meet competition for promotion from women. Not only are most trades open to women, but women are commissioned in many of the ground branches. Their work is proving most satisfactory, especially in trades where delicate work has to be done or an element of monotony endured. In present circumstances particularly the R.A.F. could not do without its women members. They are filling gaps left by slow recruiting of men Regulars in certain trades and they seem likely to justify themselves notwithstanding the shortness of their service, no matter how much the Regular recruiting of men may improve.

PLANNED MAINTENANCE

Throughout these years of rebuilding the R.A.F. has had to make the most economical use of the labour at its service. In some respects the work to be done has become simpler; in others it is much more complicated. With the arrival of the gas turbine, the maintenance of engines demands less work. The many fewer moving parts and the relative absence of vibration mean less inspection, adjustment and replacement work. On the other hand, the equipment carried in aircraft has grown in quantity and complexity, particularly as the result of developments in radar. Manpower is also required in quite large quantities for the operation and maintenance of ground radar stations and for the intricate control and reporting employed in these duties. Auxiliary airmen and airwomen are being recruited for this work, but here also recruiting is slow.

A marked economy in the man-hours absorbed by aeroplane maintenance has been accomplished in two stages, first by instituting a plan for spreading major inspection and replacement over a long period and secondly by planning the work which has to be done so that the various tradesmen do not get in each others' way and by setting a time schedule for every job of work. How valuable an orderly sequence of operations by perhaps four tradesmen in a bomber's turret can be is easy to understand. The most convenient order for the airframe fitter, the electrician, the armourer, and the radio engineer to do their respective jobs is carefully worked out by a team of experts not only for the turret but for every part of the aeroplane, together with a time allowance for each piece of work. The complete picture in full detail is in the hands of the supervising N.C.O.

who is charged with the responsibility of maintaining the proper sequence, watching the time factors, and checking the quality of the work done.

As a means of avoiding congestion and bringing order out of chaos the merits of the system are obvious, but its value goes deeper than that. The saving in man-hours is reported to be quite astonishing. The time occupied in a major overhaul of a 'Lancaster' is said to have been reduced from 12 days to 4 days; a minor overhaul from 4 days to 2½. Similar work on a 'Mosquito' is shortened from 10 days to 4½, and from 2½ to less than 1 for a major and minor respectively. This system of planned maintenance has now been running for more than two years and its originators claim that in that period the man-hours devoted to maintenance fell from 21 to 15 for every flying hour.

Evidence of this kind shows how well advanced the Service is becoming in the use of what might be called industrial methods. One British air line has been trying a similar system over roughly the same period, and, with its fairly homogeneous fleet, has reduced the man-hours required for a major and a minor overhaul by two-thirds. In this instance the incentive was to reduce trading losses; in the R.A.F. the principal incentive was to keep the biggest possible number of aircraft ready for service with the comparatively small labour force available. There may still be further bonuses to come from the new jet aircraft if, as seems likely, less maintenance work is required on instruments and airframes because of the diminished vibration of the rotary engine, but the continuing amplification of aircraft equipment may well offset this. An example of the extent to which radio equipment alone has increased in complexity is afforded by the present big bomber. In it there are 120 valves to be inspected, as compared with 10 in the pre-war bomber.

THE NEED FOR MANPOWER

What is clear is that the operational strength of the R.A.F. depends as much on manpower as on numbers of aircraft, and that will continue to be true for many years. There is no magic by which the nation can provide itself with air defence mechanically and apart from the work of human beings. The scientists and engineers agree readily that guided missiles, rockets, and automatically controlled aircraft are still far from replacing the aeroplane manned, maintained, and directed by men and women. The essential man-power has therefore to be obtained. In these days it is to be sought in competition with industry and commerce; and there is no large pool of unemployed persons from which it can be easily obtained as in the past. It has either to be attracted or directed under compulsion into the service of air defence. Labour so directed would have to be retained in the Service long enough for skilled tradesmen to be made out of raw material. That would mean a minimum of five years' conscript service; and a five-year turnover of tradesmen would mean big and expensive training centres.

THE FUTURE

A system under which the skilled and semi-skilled labour serves for long periods, forming the hard core of an essentially technical service, and a sufficient body of unskilled but trained labour is always available for work under the guidance of the Regulars, is evidently the most economical system. Now that the relation between Regular and national serviceman is being established on a satisfactory basis, it will probably prove an efficient arrangement too. The change at first shocked many of the old Regulars, who took the first opportunity to leave the Service, believing that the horde of uninterested, reluctant, and badly disciplined national servicemen had ruined the spirit and wrecked the efficiency of the Service. That has changed with the evidence that national servicemen regard it as a privilege to enter the R.A.F., that they are selected with care by the Service, and that ways have been devised to seize their interest and get the best out of them.

The indispensable element in the new arrangement is the hard core of Regulars and the body of reservists built up as they complete their engagements. Those men are such as could earn a good living and lead comfortable lives as civilians. However much they may like the idea of helping to man the first line of defence or of taking a hand in flying or of dealing with the modern aircraft and equipment of an air force, they will hesitate to engage themselves for a term of years unless they see the prospect of a good life. The Service has done wisely to aim at offering entrants a full career. It has done its best to diminish the old restrictions of Service by allowing men to wear civilian clothes and live with their families when off duty. It has plans for better quarters with provision for cubicles instead of barrack rooms, and slowly it is realising its plans for building semi-detached married quarters near but not on the station.

One thing which may constitute an obstacle is the element of uncertainty which the entrant has to accept. It may, in fact, be no more a gamble than the new arrival has to accept on entering a big commerical or industrial undertaking, but it is apt to look bigger because the Service, with strict honesty, promises nothing beyond the initial increase from recruit's pay after six months' service. Every advance after that is shown to depend on the ability of the entrant to prove his increase in qualifications.

Present inducements are not bringing forward enough men of the right type for Regular service. The manning situation has improved and is improving, but the rate is slow. Some of the reasons for slow recruiting have appeared in the course of this survey. They are almost entirely such as only the State can deal with.

E. Colston Shepherd

REFERENCE SECTION

STATEMENT ON DEFENCE 1950

(Cmd. 7895)

INTRODUCTION

1. The British people wish to live in harmony with other nations and an enduring peace is a necessary foundation for British ideals of social development. Until world peace can be assured by an effective system of collective security under the United Nations, it is the policy of His Majesty's Government to seek security through the development of collective self-defence, within the framework of the United Nations Charter, in co-operation with the other members of the Commonwealth, the United States of America and other like-minded nations. For these purposes adequate defence forces continue to be necesasry and no drastic reductions can be made so long as the present unsettled international situation persists.

2. Defence policy is based on the assumption that we should not stand alone in resisting aggression. Co-operation and consultation with other members of the Commonwealth have always been the core of our defence policy and have continued to make satisfactory progress. But now, in addition, specific engagements have been made with other peace-loving nations in the Brussels and North Atlantic Treaties. Collective self-defence was embodied in Article IV of the Brussels Treaty and in the Western Union Defence Organisation set up under it. It was carried a significant stage forward in the North Atlantic Treaty signed in April 1949.

3. The initial stages of Western Union development were set out in last year's Statement on Defence * and the work there described has been continued. At a meeting of the Brussels Treaty Consultative Council in March 1949 it was agreed that, although United States help would be needed to relieve many of the major deficiencies in the equipment of the Western Union Powers, those Powers must themselves take special steps to this end in the interests of their mutual defence. Plans were accordingly worked out by the Powers concerned for increased production of equipment as an essential contribution to the defence of Western Europe. This will of course assist in the defence of the North Atlantic area. The United Kingdom has already made a valuable contribution to the needs of Western Union by making available in 1949–50 to France, Belgium and the Netherlands considerable quantities of fighter aircraft and related equipment in order to enable these countries to build up their air defence. In 1950–51 this assistance will be continued and we shall also take a further important step by increasing the production of equipment for our own forces. The cost of these measures is reflected in the defence budget for 1950–51 and is a primary reason for the increase over the provision made

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* Cmd. 7631.

in the current year. In addition, we continue to give help to other members of the Commonwealth in meeting equipment needs for which they themselves cannot provide.

4. The signature of the North Atlantic Treaty raised new problems and progress has been made towards their solution during the last twelve months. The necessary organisation has been established and is working —from the Council and the Defence Committee down to the regional and supply organisations. The detailed machinery has already been described in a White Paper.* An overall strategic concept for the defence of the area has been drawn up and endorsed by the Council of the North Atlantic Treaty Organisation. The United States Congress has passed a Mutual Defence Assistance Act. Under that Act military aid becomes available when the overall strategic concept for the defence of the North Atlantic area has been approved by the President of the United States and bilateral treaties have been negotiated. These requirements having been fulfilled United States aid will take two main forms: first, actual equipment, and, secondly, reimbursement of the dollar costs incurred by other North Atlantic Treaty Powers as a result of increases in their own armament production. Under the first head the most important provision so far as the United Kingdom is concerned is for the equipment of some squadrons in Bomber Command with aircraft of the B.29 type. Under the second we may recover some of the dollar cost of raw materials used in the additional armament production undertaken as a contribution to the defence of the North Atlantic area.

5. The defence responsibilities of the United Kingdom Government are not, however, limited to those assumed under the Brussels and North Atlantic Treaties. The Middle East is a vital strategic area and the maintenance of our position in the Far East is essential to the security and economic well-being of the Commonwealth. We must therefore maintain our position in these areas. Furthermore, we have to distribute our forces in such a way as to meet the current burdens of garrisoning the occupied territories of enemy and ex-enemy countries and reinforcing local security measures. During the past year, though their incidence has varied, these burdens have not been lightened. We have been able to withdraw our forces from Greece, but we have had heavily to reinforce Hong Kong. We have not been able to reduce the forces needed in Malaya.

6. To meet these heavy responsibilities, expenditure totalling £780 million will be required in the next financial year. The numerical strength of the forces can, however, be reduced: in fact, the main change in the use of our resources as between 1949–50 and 1950–51 is that we shall have fewer men in the forces but shall spend more on equipment and research. The uniformed strength, which it was previously planned to reduce to 750,000 by April 1, 1950, will now be brought down to 718,800 by that date and to 682,100 by April 1, 1951—more than 100,000 below the strength a year ago. On the other hand, we propose in 1950–51 to spend nearly £35 million more on equipment and research than in 1949–50.

7. This reduction in man-power will be made keeping in mind the need to maintain the striking power of our forces. Maintenance and training establishments, already severely pruned, are being further reduced.

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* Cmd. 7883.

Headquarters staffs are being further cut. The reductions are made possible partly by the gradual return to more normal conditions, and partly by the continuous process of economising in fields of secondary importance in the interest of the strength of fighting formations. This process has been greatly helped by a comprehensive inter-Service review of the future development of the forces which the Government put in hand just over a year ago in order to establish the roles of the three Services in present circumstances and to ensure that full value was obtained for the money spent on the defence budget. This review made it clear that there were no grounds for any substantial change in the relative roles of the three Services, or for any drastic curtailment of the strength of any one of them. It was of particular value in establishing priorities and in indicating where reductions could be made with the least serious consequences.

8. This Statement is concerned with the armed forces and it would be outside its scope to deal with the progress which has been made with the preparation of plans under the Civil Defence Act, 1948. It is, however, recognised that, subject to their other commitments, the armed forces are available to co-operate in civil defence. The subject of the annual Army Staff Exercise in 1949 (in which the Home Office and other civil departments concerned took part) was a study of the future organisation of civil defence in the United Kingdom with particular reference to the part to be played by the Army. Valuable lessons were learnt from this Exercise.

9. Further details with regard to each of the three Services will be given in the Memoranda appended to the Departmental Estimates but the following paragraphs give a broad summary of the effect of the general plan on the Services as a whole.

THE DEFENCE ESTIMATES 1950–51

10. The allocation of the net defence budget for 1950–51, with comparative figures for 1949–50, is as follows:

	1950–51 *£m.*	*1949–50* *£m.*
Admiralty	193·00	189·25
War Office	299·00	304·70
Air Ministry	223·00	207·45
Ministry of Supply	65·00	57·75
Ministry of Defence	·82	·71
	780·82	759·86

An analysis of the estimates is given in Annex II* with an indication of the main differences between 1949–50 and 1950–51.

NAVY

11. The new naval construction planned in 1950–51 will consist mainly of the continuation of work on existing programmes and only small ships are due to be laid down. To meet expenditure on essential modernisation

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* Not reproduced. See "Abstracts of Service Estimates," pp. 314–5, 324–5, 332–3.

of our existing fleet and other essential services it will, however, be necessary to find economies elsewhere and naval man-power will fall to 127,500 by April 1, 1951. The reductions will be mainly in man-power ashore and in base establishments.

12. The expansion of naval forces that would be necessary in the event of war would be achieved by the bringing forward of ships at present in reserve. The maintenance of the Reserve Fleet is accordingly a task of great importance, and accounts for an appreciable proportion of naval expenditure in money and men.

ARMY

13. By April 1, 1950 the numbers in the Army will be 15,000 below the estimate in the previous Statement on Defence. A further reduction of 20,000 will be effected by April 1, 1951, when the strength will be 356,600. In the main, the reduction will be in headquarters, maintenance, and training establishments. The Army is still called upon to fulfil wide commitments all over the world and to some extent therefore the provision of the most modern equipment for future use must yield to the urgent present need for trained man-power.

14. The size of the Territorial Army will start to increase rapidly after mid-1950, when the inflow of national service men begins. When fully developed it will consist of anti-aircraft artillery units, a Field Force, home defence units, and administrative units designed to provide backing for both the regular and territorial armies in war. Recruiting for the Supplementary Reserve will be opened on an expanded scale.

AIR FORCE

15. The number of men (202,400) in the Air Force on April 1, 1950, will be about 10,000 below the planned figure, but little further change during the year is contemplated. The plan for doubling the jet fighter strength of Fighter Command will be completed and the power of Bomber Command will be increased by forming squadrons of B.29 aircraft as a result of American aid. Other Commands, except Transport, will remain broadly at their present strength. With the gradual build-up of Bomber Command there will be a reduction in the air transport force at home, but we shall retain enough transport aircraft to meet essential needs and to enable us to make an important contribution to another airlift operation should that become necessary.

RESEARCH AND DEVELOPMENT

16. In the past, substantial provision has been made under this head and the provision for 1950–51 will exceed that for the previous year. The research and development programme is co-ordinated and priorities are determined on the advice of the Defence Research Policy Committee. This is essential. The full list of problems that the Services would like solved would require a far larger part of the total scientific and technical

effort of the country than can be justified. It is, therefore, a question of selecting those projects whose solution is most vital to our defence and seems most likely to be achieved in the not too distant future. Needless to say, air defence and anti-submarine research are receiving much attention.

COLONIAL FORCES

17. A review of the colonial forces by the Chiefs of Staff Committee has been followed by consultations with the Colonial Governments concerned and, in the case of the East and West African colonies, by a conference in London. The basic difficulty is that the cost even of the forces required for internal security is often beyond the means of the colony. Means of bridging the gap are under consideration.

SUMMARY

18. To sum up: a thorough review has been undertaken from an inter-Service point of view of our present forces and the money allocated for their upkeep and development. The conclusion reached is that the existing balance between the forces is about right. On the Army and Navy together we shall spend about the same in 1950–51 as in 1949–50. On the Air Force and on research and development (much of which is for the Air Force) we shall spend rather more than an extra £20 million. So long as our present responsibilities and commitments remain, our defence budget must be a heavy one, but His Majesty's Government are satisfied that the money to be made available in 1950–51 will be spent to the best possible advantage.

MAN-POWER

19. In the man-power field there are two issues of prime interest and importance: regular recruitment and national service. All will agree that as many as possible of our peace-time defence responsibilities should be met by regular forces. His Majesty's Government hope that a position will be reached where we can rely far more on regular personnel to discharge our peace-time defence commitments. The primary object of national service (which will still be necessary in default of some major change in the international outlook) would then be the production of trained reserves. At present, however, we are a long way from this goal and national service continues to meet two vital defence needs. It provides:

(i) the only means of building up the large reserve of trained man-power that would be needed in a future war; and

(ii) the men needed in the Services to supplement the numbers which can be raised by recruitment of regulars.

REGULAR RECRUITMENT

20. Table 2 in Annex I* shows that a decline is foreseen during 1950–51 in the number of men serving on regular engagements in the Navy and

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* Not reproduced.

Army, and only a small increase in the Air Force. In the Navy this decline will result from a deliberate restriction of intakes to the level necessary to maintain the approved strength. Limitations on man-power will also reduce to 2,000 the Navy's intake of national service men. In the Army and Air Force, however, there will be a heavy wastage arising from the termination of current engagements, particularly short service and bounty engagements. Regular recruiting to the Army during the year will probably not wholly offset this wastage and a fall of 7,000 in the numbers of men serving on regular engagements is expected. In the Air Force it is expected that there will be an increase of 3,000.

21. The recruitment figures for men and boys (other ranks only) for the calendar years 1948 and 1949—excluding those on regular engagements who extended their period of service—are given in the following table. Normal regular engagements and engagements under the short service and bounty schemes are shown separately:

Regular Recruitment 1948 *and* 1949

	1948	1949
Normal Regular Engagements:		
Navy	18,000	16,200
Army	25,400	18,400
Air Force	9,900	10,300
Bounty Engagements:		
Navy	1,700	100
Army	8,500	5,400
Air Force	3,700	1,900
Total:		
Navy	19,700	16,300
Army	33,900	23,800
Air Force	13,600	12,200

22. The figures for the Navy represent the fulfilment of the desired recruiting programme. The figures for the Army and Air Force, however, fall considerably short of what is required. This is not altogether a matter for surprise. At the end of any great war there is always a general wish to get back to civilian ways of life and a consequent tendency to turn away from service with the forces. Five years after the end of World War I the total uniformed strength of the armed forces had been reduced to 340,000. To recruit the men necessary to man forces on this scale was then a comparatively simple matter. Table 2* shows that a far larger number is necessary today. To carry out the Government's aim to rely as much as possible on regular forces we need to recruit on a scale never before attempted in a time of peace and full employment.

23. Clearly, a high level of recruitment cannot be expected unless Service conditions compete in attractiveness with those of civilian life. In present circumstances there are obviously limits, both practical and financial, to the improvement of Service conditions, but much has been and is being done. The expenditure on major new works to provide accommodation for personnel in 1950–51 is estimated at £9·44 million, an increase of £2·64 million over the already high provision of £6·80

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* Not reproduced.

million in 1949–50. Reductions in the size of the forces have enabled some unsatisfactory accommodation to be evacuated. A considerable amount of work has been done in the redecorating, refurnishing and general rehabilitation of existing barracks, and in the improvement of messes, both for officers and other ranks. Further schemes of modernisation are planned. Many improvements have been and are being made in both living and working conditions in His Majesty's ships. Both in comfort and amenities the post-war troopships are greatly in advance of anything to which the forces and their families have been accustomed in the past.

24. Considerable progress has been made in the provision of married quarters since the war. To enable greater progress to be made in the United Kingdom the Armed Forces (Housing Loans) Act was passed in 1949. The sum that can be borrowed under this Act over the next five years is fixed at £40 million. Money will be advanced only for Service quarters which are so sited as to be suitable for civilian occupation should the Services no longer require them. The immediate requirement at home is for about 30,000 new permanent houses for the Services as quickly as possible. With the help of the Act the Service Departments aim to complete them in the next five years. A start will be made on between 6,000 and 7,000 houses in 1950–51. Married quarters for Service families overseas are also badly needed and it is planned to start building about 2,000 more new quarters during the year 1950–51.

25. No less important than the need to attract men into the Services is the need to persuade them to remain when their original engagements expire. A longer average period of service means a smaller annual recruiting problem. It also results in increased efficiency by conserving for the forces skill and experience that would otherwise be lost, and increased economy by reducing the expenditure of time, staff and accommodation required for training purposes.

26. During the past year arrangements for the orderly absorption of ex-regulars in civilian life have been consolidated and developed and this work will continue. Of the 37,500 ex-regular other ranks discharged from the forces in the period August 1, 1948 to July 31, 1949, only 450 were unemployed in November 1949, and of this latter number only 100 had had no employment since discharge. The position in regard to officers is admittedly less satisfactory though even in this field some progress has been made. The problem of resettlement was a prominent feature at Conference Ariel held by the Air Ministry in May 1949, when there was a full and valuable exchange of views between the Services, employers, trades unions and educational interests. It is clear that the trades unions and employers both approach the problem with good will. In order to enable them to assist more directly the Departments concerned, an advisory council is being set up under the Permanent Secretary of the Ministry of Labour with members covering the whole range of interests affected.

NATIONAL SERVICE

27. It has been suggested that the Government is confronted with a serious problem in disposing of the numbers available for national service. There is no foundation for this suggestion. The numbers estimated to be

available for call-up over the next three financial years on the existing medical standards and deferment rules are as follows:

Financial Year	*Estimated Yield from Registration*	*Maturing Deferments*	*Total*
1950–51	132,000	45,000	177,000
1951–52	124,000	57,000	181,000
1952–53	129,000	57,000	186,000

The national service intake planned for 1950–51 is as follows:

Navy	2,000
Army	117,000
Air Force	49,000
	168,000

Estimates have been made of the intake likely to be needed in 1951–52 and 1952–53 and the net result is that over the three years together registrations and maturing deferments will yield an excess of about 40,000 over the numbers of national service men needed by the Services. An excess of this size cannot be regarded as a major problem.

28. It has been the policy hitherto to control the annual intake of national service men by omitting when necessary one of the regular quarterly registrations. This method, which has the effect of raising the age of call-up by three months, has been applied once already and the present age of call-up is 18 years 3 months. The possible surplus of 40,000 in the intake during the next three years could be dealt with by raising the age of call-up by another three months over that period. It should not be necessary to raise the age at all during 1950 and 1951. Should it become necessary to raise the age of call-up in 1952 or 1953, a long period of notice could be given and on present assumptions the normal age of call-up at the beginning of 1953 should not exceed 18 years 6 months.

29. The table in paragraph 27 shows that in 1950–51 and succeeding years a great many young men whose period of whole-time national service was originally deferred in order that, for example, they might complete courses of training or apprenticeships, will become liable to call-up. The best possible use will be made by the Services of the ability and skill which these men have acquired in civil life. This is in the interest of the Services themselves and also helps to ensure that the men return to industry with at all events no less skill than they possessed when they were called up. Some good work has already been done on these lines.

30. Nevertheless, there is a limit to what can be done towards relating the abilities of the man and the needs of the Services. Despite the changes that have been made, Service trades are not wholly interchangeable with civilian trades, and between Service and civilian life there is a wide difference in the proportions in which the various classes of tradesmen are required.

RESERVE AND AUXILIARY FORCES

31. The Services rely on their voluntary reserve and auxiliary forces to supplement the skilled men in their regular reserves. The War Office in addition, are dependent on the volunteer element in the Territorial Army to provide the instructors for training the large numbers of national service men who will begin to pass into the Territorial Army for their reserve training after the middle of 1950. The following table shows the progress that has been achieved during the year in recruiting to the volunteer reserve and auxiliary forces:

Strength of Reserve and Auxiliary Forces, January 1, 1949, *and January* 1, 1950

	Strength at Jan. 1, 1949	*Strength at Jan.* 1, 1950	*Target*
Royal Naval Volunteer Reserve ..	3,241	5,150	15,000
Royal Marine Forces Volunteer Reserve	177	500	1,500
Territorial Army and Women's Royal Army Corps (T.A.)	67,210	82,500	150,000
Royal Auxiliary Air Force	3,509	5,900	29,000
Royal Air Force Volunteer Reserve..	4,459	8,100	38,000

32. Though the build-up of the Territorial Army has not been as satisfactory as the Government would have wished, the quality of the volunteers coming forward has been excellent, and everything possible is being done to ensure that the national service recruits will be adequately trained during their period of reserve training. The expansion of the Royal Auxiliary Air Force and R.A.F. Volunteer Reserve has also been slow, but it is satisfactory that the number of pilots in these forces is already nearly up to requirements.

32. Important improvements in the organisation and effectiveness of the reserve and auxiliary forces were made in December 1949 by the Auxiliary and Reserve Forces Act. This measure modernised the constitution and powers of Territorial and Auxiliary Forces Associations. It also simplified the procedure for calling out reserves in a national emergency and provided for an increase in the number of reservists from all three Services who would be readily available to meet minor emergencies overseas.

SUMMARY

34. Broadly, therefore, the Government's policy for manning the Services is: first, to encourage by all practicable means regular recruiting and re-engagements; second, to rely, as they must, on the continuance of national service to make up the numbers required to meet current commitments and to provide trained reserves; and third, by ensuring that both regulars and national service men are employed to the best advantage, to keep the total numbers in the Services as low as possible, consistent with meeting our commitments. No other policy is possible at the present time. The theory, for example, that regular recruiting could be improved

to such an extent as to make it unnecessary in the near future to employ national service men otherwise than under training is quite unrealistic. The idea that the present principle of universality of national service should be abandoned in favour of a scheme under which a smaller number of men, selected by ballot or otherwise, would be required to serve for a period of eighteen months or more is, in the Government's view, equally impracticable.

STATEMENT OF THE FIRST LORD OF THE ADMIRALTY EXPLANATORY OF THE NAVY ESTIMATES, 1950–51

(Cmd. 7897)

The proposed provision for the Naval Service for the financial year 1950–1951 is £193,000,000, which is £3,750,000 more than the sum voted by Parliament for 1949–50. The Supplementary Estimate which I am presenting concurrently shows that the gross expenditure on naval services during 1949–50 is likely to exceed the gross provision in the Estimates for that year by £2,000,000, although this sum can be more than met by additional receipts accruing during the year.

For 1950–51 increased provision has had to be made for the Reserves and for non-effective services; at the same time account has had to be taken of higher prices and certain increases in pay, together with the exhaustion of war-time stocks and special measures in the Far East.

Policy during the forthcoming year will be directed to achieving the proper balance of expenditure in present circumstances between personnel on the one hand and production, including research and development, on the other. It is proposed to reduce the requirements for naval personnel by administrative economies in shore establishments (without effect on the sea-going Fleets) and to spend more money on material and equipment for the Fleet.

Vote A provides for a maximum bearing of 143,000 for the Royal Navy, Royal Marines, and ancillary services. This figure includes 6,000 for the Women's Royal Naval Service and 240 for the Queen Alexandra's Royal Naval Nursing Service. It also includes at the maximum approximately 1,200 men and women on terminal leave, and some 3,200 local entrants on foreign stations. Provision is not necessary in Vote A this year for the R.M. Police who since October 1949 have been absorbed into the Admiralty Civil Constabulary.

During the year the strength of the Navy will be progressively reduced with the effect that the demand on United Kingdom manpower for the Navy will fall from about 140,000 at the beginning of the financial year to 127,500 at the end, in comparison with 144,500 at April 1, 1949. The greater part of the reduction will be brought about by a smaller intake of National Service men. Regular strength, which has been steadily building up since the war, will be slightly reduced during the year, but it will remain as high as practical considerations permit, with a view to the most economical manning of the peace-time Fleet.

As a result of these measures it has been possible to increase the net provision in the current Estimates for production and research to £72,930,000 in comparison with the sum of £62,670,000 which was provided for these services in the Navy Estimates for 1949–50. The production programme provides for the material maintenance (including repairs and refits) of the Active and Reserve Fleets, for replenishment of essential stocks, for progress with new construction and modernisation and appropriate allowances for additional requirements for Western Union and North Atlantic defence. The increase of £10,260,000 is largely in respect of production services.

I propose during the forthcoming year to undertake a small programme of new construction limited to minor types of warship. Provision in the Estimates for 1950–51 under this head is £12,907,000 compared with £10,880,000 in the original Estimates for the current financial year, though the latter figure is modified by the Supplementary Estimate. The bulk of the expenditure in 1950–51 will be in respect of ships approved in earlier Programmes on which work is already proceeding.

One of the major tasks confronting the Admiralty is the protection of shipping in any future war against attack by high speed submarines. During the past year technical as well as tactical advances have been achieved in our anti-submarine measures, and exercises for the protection of convoys against submarine attack have been prominent in the training of the main Fleets.

The Admiralty is closely concerned in the maintenance of a healthy strategic and economic level of work and employment in the shipbuilding and ship repairing industries, and now that the merchant fleet tonnage has been virtually restored to its pre-war level, and the heavy arrears of repair work have been largely overtaken, a comprehensive investigation is being made into this problem.

HALL

SOME NOTES ON NAVAL ACTIVITIES AND ADMIRALTY POLICY

The Far East

The dispositions of the Far East Fleet have been almost entirely governed by events on the Chinese mainland, and in order to meet adequately any possible threat to the colony of Hong Kong, the strength of the Far East Fleet was augmented by an aircraft carrier, a cruiser, and several smaller units, which were transferred to the Station from the Mediterranean and the America and West Indies Stations. The Royal Marine Commando Brigade was transferred from Malta to Hong Kong.

The year has been an unhappy period in the long association of the Royal Navy with the Chinese Navy. It was with regret that the Royal Navy learned that, following her defection from the Nationalist Navy, the C.S. Chungking, formerly H.M.S. Aurora, had been attacked and sunk by the Chinese Nationalist Air Force in March 1949. Fearing that a similar fate might overtake the C.S. Ling Fu (formerly H.M.S. Mendip which was on a five-year loan to the Chinese Navy) negotiations were at once started for her return to the Royal Navy, which took place on May 27, 1949.

H.M.S. Amethyst, whilst proceeding up the Yangtse River on the morning of April 20, 1949, to relieve H.M.S. Consort at Nanking, was attacked and damaged by gunfire some 60 miles from Nanking and ran aground at Rose Island. H.M.S. Consort immediately proceeded down river and attempted to take H.M.S. Amethyst in tow. Her efforts were defeated by heavy gunfire and she was compelled to withdraw down river. On the morning of April 21, H.M.S. London, wearing the flag of Flag Officer Second in Command Far East Station, and H.M.S. Black Swan proceeded up river with the object of taking H.M.S. Amethyst in tow. Gunfire from shore batteries was directed at the two ships and proved so heavy that further attempts to rescue H.M.S. Amethyst would have resulted only in serious loss of life, and the ships thereupon withdrew and returned to Shanghai. The total casualties in all four ships amounted to 42 dead and 53 wounded.

In the following three months, continual efforts were made to secure the release of the ship by peaceful means, but the negotiations were quite unavailing. Accordingly the Commanding Officer, with the approval of the Commander-in-Chief, decided that escape was the only way to freedom and the only alternative to the destruction of his ship and the imprisonment of the crew. Preparations for escape were therefore made and were put into effect on the night of July 30, 1949. Seven hours later, in spite of attacks by gunfire and navigational difficulties, H.M.S. Amethyst rejoined the Fleet.

The closure of certain ports and territorial waters by the Chinese Nationalists imposed an onerous task on the destroyers and frigates of the Far East Fleet, notably at Shanghai, where the Nationalists made great efforts to make the closure effective. Since June 1949 H.M. Ships have been on patrol at the entrance of the Yangtse to protect British merchant ships engaged in trading with Shanghai. Recognition of the Central Peoples Government of China has not brought any respite to H.M. Ships on patrol, which must be ready to afford assistance to merchant ships in that area.

ALBANIA

On April 9, 1949 the International Court of Justice gave judgment in the Corfu Channel case; on December 15, after further pleadings, the Court fixed the amount of compensation due from Albania to the United Kingdom at £843,947, namely the full amount of the British claim.

CRUISES AND EXERCISES

Exercise "Verity," consisting of large scale exercises in conjunction with the French, Dutch, and Belgian Navies, was carried out last summer. It consisted of convoy, bombardment, air strikes, mine-laying, and minesweeping exercises, and was arranged with the object of giving practice in joint operations. Particular emphasis was laid on the problems connected with the escorting and defence of a convoy. The exercise was very successful and was greatly appreciated by the Western Union Navies.

Ships of the Home Fleet left Portland on January 28, 1950, for three weeks' weapon training at Gibraltar followed by combined exercises with the Mediterranean Fleet and visits to Mediterranean ports. Joint Anglo-French exercises are to be carried out in which units of the Home and Mediterranean Fleets will take part. The exercises include tactical and convoy protection exercises and will end with a bombardment of the range at Arzeu in Algeria.

THE LOSS OF H.M. SUBMARINE TRUCULENT

On January 12, 1950, H.M. Submarine Truculent was in collision with the Swedish tanker Divina in the Thames Estuary and sank immediately with the loss of 64 lives. Full information of the circumstances in which this regrettable accident occurred has already been made public. The Board of Admiralty wish to take this opportunity of recording officially their sympathy with the relatives of the Naval and civilian personnel who perished in this tragic disaster.

The gallantry and splendid example to the crew of Lieutenant F. J. Hindes, R.N. (the First Lieutenant), and Chief Engineroom Artificer F. W. Hine, D.S.M., have been recognised by His Majesty the King by the posthumous award to each of the Albert Medal.

STRENGTH OF THE FLEET

The table below shows the strength of the Fleet in classes (excluding vessels of the Fleet Train, attendant ships, and the numerous small craft). The principal change since the publication of the corresponding table last year has been the placing in reserve of four of the battleships for reasons previously announced.

	Active Fleet	Training and experimental, etc. (special complements)	In Reserve or reducing to Reserve (not including ships for disposal)	In course of construction*
Battleships	—	Vanguard	Anson Howe Duke of York King George V	—
Fleet Carriers ..	Implacable	Victorious (*a*) Illustrious	Indefatigable (*b*) Indomitable (*b*) Formidable	2
Light Fleet Carriers	Vengeance Theseus Glory Triumph	Ocean	Warrior	7 (*f*)
Escort Carriers ..	—	—	Campania (*c*)	—
Cruisers	14	2	10	3
Destroyers	34	18	61 (*d*)	8
Frigates	27	15	123	—
Monitors	—	—	2	—
Submarines ..	32	—	34 (*e*)	—
Minesweepers ..	10	2	54	—
Fast Minelayers ..	—	—	3	—

* Work on some ships temporarily suspended (for details see Navy Estimates 1950–51, pp. 245–247).

(*a*) To be taken in hand for modernisation during 1950.

(*b*) Refitting.

(*c*) To be lent to the Festival of Britain for about 2 years.

(*d*) Includes one for transfer to Royal Pakistan Navy and one for the South African Naval Force.

(*e*) Includes 2 on loan to Royal Netherlands Navy.

(*f*) Excludes 1 for transfer to the Royal Australian Navy.

TRANSFER OF H.M. SHIPS TO COMMONWEALTH AND OTHER NAVIES

During the year 1949–50, various Commonwealth Governments acquired ships from the Royal Navy for the development of their Navies.

The Government of New Zealand has acquired the last two of six 'Loch' Class frigates, the first four of which were transferred during 1948.

Three destroyers have been transferred to the Union of India and two to the Government of Pakistan. Arrangements are also in hand to transfer a destroyer to the South African Naval Force.

Transfers to foreign countries during the year include the first two of six 'Algerine' minesweepers to be acquired by Belgium, three frigates to Egypt, a maintenance ship and a minesweeper to Iran, and two frigates to Portugal.

A tabular statement of H.M. Ships (frigates and above) given or sold since 1945, or at present on loan, is shown below:

Ships	*To Commonwealth Governments*	*To Foreign Governments*	*Total*
Light Fleet Carriers ..	2	2	4
Cruisers	3	1	4
Destroyers	12	21	33
Frigates*..	16†	30‡	46
Submarines	—	20	20

* Not included in last year's statement (Cmd. 7632).
† Includes 4 previously known as corvettes.
‡ Includes 13 previously known as corvettes.

NEW CONSTRUCTION AND REPAIR

Although the commercial shipyards continue to be engaged almost entirely on merchant shipbuilding work, some part of the continuing programme of Naval new construction is now proceeding at a rather quicker rate than has so far been possible since the war.

During the financial year now ending one frigate, H.M.S. Mounts Bay, a surveying ship, H.M.S. Owen, and a motor torpedo boat were completed. Details of the ships in course of construction are contained in the Tables on pages 244–247 of the Navy Estimates. The fleet carrier referred to in the table on page 244, which shows H.M. Ships in course of construction but not yet launched, is the Ark Royal, which is to be launched early in the coming financial year; the light fleet carrier is the Hermes.

It is expected that during the course of the financial year two escort vessels of new design will be laid down. Provision is also made to start the construction of minesweepers of new design.

MODERNISATION AND CONVERSION

During 1949–50 work was put in hand on converting the Cumberland to a trials cruiser to be used for the trial and testing of certain naval equipment.

Certain existing vessels will be converted to types which will satisfy new tactical requirements. Two destroyers of war-time construction were taken in hand during the current financial year for conversion to anti-submarine frigates. It is hoped to take in hand at least three more of these conversions during 1950–51.

The modernisation of the aircraft carrier Victorious will be started during the course of the year; this will be the first of several such vessels to be modernised to increase their fighting efficiency.

Large Repairs and Refits

Extensive repairs are to continue on an aircraft carrier and one cruiser, and provision is made to enable large repairs on three other cruisers to be commenced. The work of refitting the Reserve Fleet has continued during the past year, both in the Dockyards and in commercial yards. A large number of Reserve Fleet ships have now been refitted and work on further ships will be undertaken during 1950–51.

NAVAL AVIATION

During the past year the lessons of experience were applied with considerable success to the improvement of tactics, training, and equipment for the all-important role of aviation in the Royal Navy. At the same time, economies have been made in the use of manpower and material, particularly in shore-based air training.

Although jet-propelled aircraft will not be introduced into the Carrier Air Groups of the Fleet until the coming financial year, jet-propelled naval fighters have been embarked in aircraft carriers for fleet exercises during the past year and useful experience has been gained.

A review has been made of the state of readiness required of the airfields held in reserve in the Home Air Command. As a result it has been decided that eight reserve airfields can be released provided that their use by the Navy in war or emergency is adequately safeguarded.

Aircraft of the Royal Navy co-operated with the Royal Air Force during the exercises to test the air defence of Great Britain. Naval aircraft also co-operated with the Royal Air Force and B.A.O.R. in an exercise in land/air warfare which was held in Germany.

During the summer, the four R.N.V.R. Air Squadrons embarked in carriers of the Home Fleet for realistic training which was carried out successfully.

RESEARCH AND DEVELOPMENT

The greater part of our scientific effort is directed to counter-measures against the various forms of high-speed attack which may be expected in the future. These include attacks by high-speed jet aircraft, by high-speed missiles, and by submarines with underwater speed, submerged endurance and capacity for deep diving greater than anything we have faced in the past. To meet these threats we must improve the capabilities of our existing weapons and, in many cases, develop completely new ones.

Much valuable information on the probable effect of enemy weapons, the effectiveness of our counter-measures, and the performance of our own weapons of attack continues to be obtained from trials in which surplus warships are used as targets. The expenditure involved in these trials is negligible in comparison with the value of the results achieved, and there is little or no material loss.

The natural consequences of the probability of faster air attack are requirements for, among other things, guided weapons, increased range and speed of radar warning, predictors of much higher performance, improvements in the rate of fire of A.A. guns, and proximity fuzes. In addition, the performance of our carrier-borne fighters must be increased, and this involves the introduction of jet fighters with consequent changes in landing and handling techniques.

The greater underwater threat of the future demands increased ranges of underwater detection, new ahead-thrown weapons, homing torpedoes and fast submarines capable of meeting an enemy on terms at least of equality.

The above developments tend to increase the demands for weight and space made upon the design of warships. Accordingly the Admiralty is devoting considerable effort to improvements in the propulsive and auxiliary machinery for H.M. ships in order to be able to allocate a higher proportion of the capacity and displacement to offensive and defensive equipment. This effort is directed to improvements in the fields of high performance steam machinery, diesel machinery, and in gas turbines. Good progress is being made and the results will be of benefit not only to H.M. ships but also to the Merchant Navy.

Research continues on the problems of protecting men from the effects of harmful radiations released by atomic weapons.

Many of the projects mentioned above are now entering upon the most expensive phase of their development, with a consequent tendency to a steep rise in the cost of research and development for a period.

Considerations of humanity as well as Service requirements have made exact knowledge necessary of the ability of men to survive in very cold conditions at sea, and a naval and scientific party has sailed to northern waters in H.M.S. Truelove to carry out experiments. Data has been accumulated from the Scott and Shackleton Expeditions and reports from survivors during World War II.

WORKS PROGRAMME FOR 1950–51

Provision has been made for progressing the construction of married quarters. In particular the passing of the Armed Forces (Housing Loans) Act, 1949, which authorises loans from the Consolidated Fund in certain circumstances for the building of married quarters, will enable the Admiralty substantially to accelerate the programme in Great Britain. For details of the programmes for Home and Abroad *see* pages 156–159 (Vote 10) and page 234 (Vote 15) in the Navy Estimates.

The modernisation of the R.N. and R.M. Barracks is proceeding and schemes are in hand at Portsmouth, Chatham, and Deal; it is proposed to commence work at Plymouth shortly. It is also proposed to undertake other works to improve the living conditions of officers and men.

The programme of reconstruction of runways at Naval Air Stations to meet the needs of modern aircraft is continuing.

It is hoped to make substantial progress on the major extension of the classrooms and workshops at the Engineering College at Manadon.

The replanning of the Dockyards continues, but the scope of the work is limited by financial considerations.

HYDROGRAPHY AND METEOROLOGY

At the beginning of the financial year 1950–51 the Royal Naval Surveying Service will be operating with four ships and six launches in home waters and with three ships in foreign waters. In addition, one ship will be employed in various parts of the world on scientific discovery and research work. It is hoped to complete the conversion of a 'Bay'-class frigate during the year, and to commission her for service in home waters in place of one of the older ships now in service.

Priority for work in home waters will continue to be given to surveys of war-time wrecks which are being dispersed in the interests of safe navigation. Other surveys on the coasts of Great Britain are required to ensure the correction of charts which cover areas liable to constant change. Surveys in foreign waters will be carried out in areas which in former years have never been methodically examined.

The Naval Meteorological Service, formerly administered by the Hydrographer of the Navy, has been re-named the Naval Weather Service, and is being re-constituted with a separate Headquarters Department. Otherwise this Service remains as before and continues to work in close co-operation with the Air Ministry, Colonial Office, and the Commonwealth meteorological services.

The Royal Greenwich Observatory

The Astronomer Royal with his secretariat, the Chronometer Department, the Solar Department, and the Nautical Almanac Office have now moved to Herstmonceux Castle.

It is expected that the conversion work inside Herstmonceux Castle, to which the Royal Observatory at Greenwich is being transferred, will be completed during the financial year 1950–51. The Solar Building has been completed and the spectrograph cellars are in an advanced stage of construction. The requirements for the remaining buildings have been drawn up and a consulting architect has been appointed by the Admiralty to prepare designs.

The optical design of the Isaac Newton Telescope has been settled in its broad outlines, and the mechanical design is under consideration. Some work on methods of automatic star following by the use of photo-electric methods is in progress. A 98-inch diameter pyrex glass disk, 18 inches thick, has been presented by the Trustees of the McGregor Fund of Detroit to the Royal Greenwich Observatory, and the main mirror for the Isaac Newton Telescope will be made from this disk.

Non-magnetic Survey Ship Research

It has been decided not to complete this vessel, which was designed in 1935 to carry out the systematic magnetic observations necessary to determine magnetic variations. At that time the magnetic compass was still the primary means of determining direction at sea, both in the Royal and Merchant Navies. Since then, however, it has been largely superseded by the gyro-compass in the Navy and, to a lesser extent, in the Merchant Navy. The intended function of the Research can, therefore, no longer be regarded as an essential requirement.

NAVAL PERSONNEL

STRENGTHS

The reduced requirements for naval personnel will, as stated in the introductory statement, be effected by economies in shore establishments (including certain Royal Marine establishments). In addition, a smaller training organisation will be sufficient for consequently reduced intakes which will thus lead to economies in instructors and administrative staffs.

Wastage during the year will be high in the normal course because relatively large numbers of officers and men, including those on extended service engagements and ratings who entered in 1937 and 1938 (when the intake was high) for a period of twelve years, will reach the end of their periods of service, but it will still be necessary to decrease the rate of recruitment to conform with the level of naval manpower now proposed. It is also proposed to reduce the effective strength of the W.R.N.S. by 800 during the year.

RECRUITMENT OF REGULARS

In the past year the Navy has been successful in attracting the total number of recruits needed but there is a shortage of recruits for certain Branches which are still below strength.

RE-ENGAGEMENTS

The Navy as a whole is feeling the effects of an insufficiency of experienced ratings, which arises partly from the small number of regular engagements during the war and partly from the heavy loss of men who, having completed their twelve years' service, are not re-engaging to complete their qualifying time for pension in the same proportion as they did before the war. Special measures calculated to attract a higher proportion of men to re-engage are being examined.

NATIONAL SERVICE

The decision to reduce the numerical strength of the Navy entails restriction on the intake of national servicemen. Two thousand will be entered during the Financial Year 1950–51 and the numbers of national servicemen in the Royal Navy and Royal Marines will thus fall from about 11,000 at the beginning of the year to some 3,000 at the end.

The selection of national servicemen as candidates for commissions in the Royal Naval Volunteer Reserve will be continued and, in addition, a new scheme has been introduced for training suitable national servicemen as officer pilots and observers.

RESERVES

Recruiting for the Royal Fleet Reserve has continued satisfactorily, but for reasons of economy there will be no increase in the strength of this reserve during 1950–51.

Recruiting for both the General Service and Patrol Service sections of the Royal Naval Reserve is now proceeding and during the year the strength of this reserve should reach about 6,000 officers and men.

Provision is also made for the Royal Naval Volunteer Reserve and the Royal Marine Forces Volunteer Reserve to increase to total strengths of approximately 9,000 and 1,500 respectively. The number of young recruits that can be accepted into these two reserves, prior to registering for national service and thus becoming entitled to do their national service in the Navy or Marines, is limited by the reduced intake of national servicemen.

SHORE ESTABLISHMENTS

During the past year further progress has been made in concentrating naval shore establishments in the interests of efficiency and reduced overhead expenditure. The Training Establishment at Corsham, Wiltshire (H.M.S. Royal Arthur) has been closed down and the basic training of new entries, formerly undertaken at this establishment, will now be carried out in the R.N. Barracks at the manning ports. Similarly, H.M.S. Wildfire (Sheerness), H.M.S. Kestrel (Worthy Down) and H.M.S. Bruce (Crail, Fife) have been closed in whole or in part. Arrangements have also been made with the Ministry of Transport for duties previously carried out by the Admiralty at certain shore signal stations to be transferred to H.M. Coastguard.

The Damage Control and Firefighting Training Schools of the Royal Navy at Stamshaw near Portsmouth have been merged with the Chemical Defence Training Establishment under a unified command with the title of Royal Naval Defence School.

The Royal Naval School of Music, which during and since the war has been located in temporary accommodation at Burford in Oxfordshire, has returned to Deal and is now accommodated with the Royal Marine Depot under a unified command.

As it has been found possible to make satisfactory arrangements for the accommodation of naval patients in other hospitals in Scotland, it has been decided to close the Royal Naval Hospital at Port Edgar.

ADMIRALTY OFFICE

The number of staff at Admiralty Headquarters stood at 10,980 on January 1, 1950, and showed a reduction of 1,010 or 8·4 per cent. on the corresponding figure of 11,990 on January 1, 1949. Further reductions will be made during the forthcoming year.

A committee, including an experienced Trade Union representative and one of industry, has recently been appointed to conduct a comprehensive review of Admiralty organisation in the light of present-day requirements.

EVENTS OF NAVAL INTEREST DURING THE YEAR

H.M. The King Visits U.S. Flagship

On November 8, H.M. The King, accompanied by the First Lord of the Admiralty and the First Sea Lord, visited the United States Cruiser Columbus, the flagship of Admiral Conolly, Commander of the U.S. Naval Forces in the Eastern Atlantic and Mediterranean, which was visiting Portsmouth.

VISIT OF H.M. KING ABDULLAH OF JORDAN

H.M. King Abdullah of Jordan, accompanied by his son, H.R.H. Prince Naif, and Ministers and Officials, visited the Portsmouth Command on August 19.

LAUNCHING OF H.M. SHIPS DARING AND DECOY

H.M.S. Decoy, the first of the new 'Daring' class of destroyers, was launched in March 1949, and her sister ship, H.M.S. Daring, was launched in August of the same year. These destroyers embody knowledge gained from experience during the late war the the results of scientific research that has since been carried out.

THE SINKING OF THE OLD IMPLACABLE

The old Implacable (originally the Duguay Trouin, a French vessel launched at Rochefort and which fought at Trafalgar) became unsafe, and all other methods of disposal having proved impracticable, she was sunk in deep water off the Isle of Wight on December 2, 1949. Commemorative caskets made from the vessel's timber have been prepared for presentation to the French Government and to the museum at Rochefort.

ABSTRACT OF NAVY

Vote	Service	Estimates, 1950–51		
A	Maximum number of officers, seamen, boys, and Royal Marines, and members of the Women's Royal Naval Service and the Naval Nursing Service			*Maximum Numbers* —— 143,000
	Maximum number of Royal Marine Police			—
		Gross Estimate	Appropriations in Aid	Net Estimate
		£	£	£
1	Pay, etc., of the Royal Navy and Royal Marines	35,124,000	280,000	34,844,000
2	Victualling and clothing for the Navy	15,546,000	3,463,000	12,083,000
3	Medical establishments and services	1,594,000	82,000	1,512,000
4	Civilians employed on Fleet services	5,930,000	50,000	5,880,000
5	Educational services	826,000	88,000	738,000
6	Scientific services	9,157,000	460,000	8,697,000
7	Royal Naval Reserves	1,235,100	100	1,235,000
8	Shipbuilding, repairs, maintenance, tenance, etc.			
	Section I.—Personnel ..	26,214,000	446,000	25,768,000
	Section II.—Matériel ..	32,143,000	7,593,000	24,550,000
	Section III.—Contract Work	34,304,000	2,627,000	31,677,000
9	Naval armaments	15,061,000	3,000,000	12,061,000
10	Works, buildings, and repairs at home and abroad	10,407,500	2,097,500	8,310,000
11	Miscellaneous effective services ..	7,172,200	2,208,300	4,963,900
12	Admiralty Office	5,355,000	5,000	5,350,000
13	Non-effective services	15,306,000	121,000	15,185,000
14	Merchant shipbuilding, etc. ..	161,100	15,100	146,000
15	Additional married quarters ..	700,100	700,000	100
	Total .. .. .. £	216,236,000	23,236,000	193,000,000

(*a*) Owing to transfers of certain services and personnel between Votes, the totals shown
a proper comparison to be made between the provision for 1950–51 and the previous year,
footnotes to the various Votes.

(*b*) Exclusive of Supplementary Estimates of £10 (H.C.1/1950).

Admiralty, 4 *March* 1950	HALL FRASER	CECIL HARCOURT MICHAEL DENNY

ESTIMATES, 1950–51

Estimates, 1949–50 (*a*)			Difference on Net Estimates		Vote
		Maximum Numbers		*Decrease*	
		153,000		10,000	A
		1,400		1,400	
Gross Estimate	Appropriations in Aid	Net Estimate	Increase	Decrease	
£	£	£	£	£	
36,997,000	285,000	36,712,000	—	1,868,000	1
15,225,000	3,560,000	11,665,000	418,000	—	2
1,566,800	56,000	1,510,800	1,200	—	3
6,125,900	20,000	6,105,900	—	225,900	4
800,000	105,000	695,000	43,000	—	5
7,354,300	414,000	6,940,300	1,756,700	—	6
1,000,100	100	1,000,000	235,000	—	7
					8
26,125,300	200,000	25,925,300	—	157,300	Sec. I
28,290,000	8,070,000	20,220,000	4,330,000	—	Sec. II
31,421,700	2,630,000	28,791,700	2,885,300	—	Sec. III
14,780,700	1,740,000	13,040,700	—	979,700	9
10,916,000	650,000	10,266,000	—	1,956,000	10
7,968,200	1,886,900	6,081,300	—	1,117,400	11
5,641,000	5,000	5,636,000	—	286,000	12
14,695,000	82,000	14,613,000	572,000	—	13
103,000	56,000	47,000	99,000	—	14
—	—	—	100	—	15
209,010,000	19,760,000	(*b*) 189,250,000	10,340,300	6,590,300	

Net increase £3,750,000

under Votes 1, 2, 3, 4, 6, 8 (Sections I and III), 9, 11, and 12 have been adjusted to enable
and so differ from those printed in the Navy Estimates 1949–50. Details are given in

H. A. PACKER	GEORGE CREASY	JAMES CALLAGHAN
M. J. MANSERGH	RALPH EDWARDS	W. J. EDWARDS
		J. G. LANG

MEMORANDUM OF THE SECRETARY OF STATE FOR WAR RELATING TO THE ARMY ESTIMATES FOR 1950–51

(Cmd. 7896)

The Army Estimates for 1950–51 amounted to:

	£
Gross Expenditure	341,600,100
Appropriations in Aid	42,600,000
Net Expenditure	£299,000,100

2. For the three previous years the figures were:

	1949–50	1948–49	1947–48
	£	£	£
Gross Expenditure ..	356,200,000	340,100,000	506,328,000
Appropriations in Aid ..	51,500,000	35,100,000	118,328,000
Net Expenditure ..	£304,700,000	£305,000,000(*a*)	£388,000,000(*a*)

3. Gross Expenditure in the Army Estimates for 1950–51 is appreciably lower than in the Estimates for 1949–50. Considerable economies have been achieved in 1949–50 in the personnel of the Army, and the Vote A figures for British troops in particular show a reduction of 39,300 (excluding men on release leave). These reductions are reflected in the Estimates for 1950–51 in the lower provision required for the pay of the Army, movements and supplies and for the pay of civilians, although to some extent the reductions are offset by additional costs arising out of the situation in Hong Kong and Malaya and by other factors. In 1950–51 the gross provision for stores is somewhat less than in 1949–50. This includes substantial provision for equipment to enable us to fulfil our commitments to Western Union. The provision for works (including the new Vote 11 covering married quarters to be paid for under the Armed Forces (Housing Loans) Act, 1949) shows a considerable increase, and this is primarily to provide more and better accommodation. The non-effective vote also shows an appreciable increase and this is likely to be a feature of Army Estimates for some years to come, consequent on the improvements in the post-war pension code.

4. The Appropriations in Aid in the Estimates for 1950–51 are not as large as in 1949–50. The reduction mainly arises from decreased receipts from the sales of stores and fixed assets.

COMPOSITION AND RECRUITING OF THE REGULAR ARMY

5. By July 1950 the release will have been completed of all those men called up prior to 1949 under the transition scheme and thereafter the Army will be composed of a Regular element and of men called up under

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(*a*) Excluding Supplementary Estimates.

the National Service (Amendment) Act, 1948, who will give 18 months whole-time service with the Active Army and 4 years' part-time service subsequently in the Territorial Army.

6. During 1949, 18,400 volunteers were enlisted on normal engagements, of whom 2,300 were men already serving on non-Regular engagements. This figure is considerably lower than that for 1948, which in turn was lower than that for 1947. In addition 5,400 men with previous service have been enlisted on short service engagements. These figures reveal a serious situation and unless the downward trend can be arrested, the problem of maintaining an efficient Army will become increasingly difficult in 1951 and 1952. During 1949 the rate of regular recruitment was sufficient to make good wastage and to increase slightly the Regular element of the Army, but the same level of recruiting in 1950 would not suffice to do this, in view of increased wastage due to the large number of regular and short-service engagements which will expire during the year.

7. Moreover, the Army can never be fully efficient and the national servicemen be properly trained and economically employed unless the Regular element is appreciably increased. Owing to the lack of Regulars it has been essential to use national servicemen in units in all theatres overseas, and, although their performance has been highly satisfactory, such a course is clearly undesirable if it can be avoided. The national serviceman also can never wholly replace the Regular, as the relatively short period for which he serves precludes him from reaching the higher ranks of non-commissioned officer or supplying the needs of the Army in certain trades and specialist tasks. Measures already in hand to improve conditions of service should help to achieve the desired increase in Regular recruits: other measures are under consideration.

WOMEN'S SERVICES

8. As recorded in the Memorandum relating to the Army Estimates for 1949–50, the Queen Alexandra's Royal Army Nursing Corps was formed as a Regular Corps on February 1, 1949, and new terms and conditions of service for nurses serving in the Corps were announced early this year. Recruitment of officers for the Corps has improved during the year and it is hoped that the new terms will go far to ensure that sufficient nurses are secured to enable the Corps to fulfil all the calls that are made upon it.

9. It is hoped to open recruiting of other ranks for the Queen Alexandra's Royal Army Nursing Corps in the near future; they will be trained and employed as nursing orderlies, radiographers, masseurs, hospital cooks, laboratory assistants, etc., and some will be able to reach commissioned rank, in which they would be employed on administrative duties with the Medical Services. This new development should offer an interesting career to many who desire to acquire these qualifications, whilst also enabling them to render effective service in civilian life when the time comes for them to leave the Army. It should be added that those who desire to acquire full nursing qualifications will be given the opportunity to do so whilst serving with the Corps.

10. Progress has been made in the organisation and recruitment of the Women's Royal Army Corps and up to December 31 last 2,100 volunteers had been enlisted into it. Some were serving members of the Auxiliary

Territorial Service, who transferred to the new Corps, but the great majority were recruits from civilian life. Short types of engagements were introduced in December 1949 in order to stimulate recruiting.

11. Open recruitment into the Women's Royal Army Corps (Territorial Army) began on February 1, 1949. By the end of the year over 6,000 women had volunteered for service in the Corps and had been accepted. In addition, the Women's Royal Army Corps Reserve, which is a voluntary unpaid body, has now been opened to enlistment. Women who have held commissions in the Women's Services may now join the Territorial Army Reserve of Officers; and we have also decided to open to women certain posts, both for officers and other ranks, in the Supplementary Reserve.

DISCIPLINE

12. The improvement in discipline throughout the Army noted during 1948 has been well maintained in 1949. Absence without leave and desertion continue to account for the major proportion of disciplinary cases, but the combined figures for these offences have continued to decrease during the year. Delay in bringing accused persons to trial has continued to be reduced.

13. The morale of national servicemen has been generally high, and has been most marked in those theatres overseas in which they have had arduous duties to perform.

EDUCATION

14. The work of the Royal Army Educational Corps has continued to develop satisfactorily throughout the year, although some strain has been thrown on the Army's educational resources by the measures necessary to deal with the proportion of men called up under the National Service Act whose standard of education is low. Educational tests and standards have been introduced as part of the general qualifications for promotion. The Central Committee for Adult Education in H.M. Forces, which replaced the Central Advisory Council in 1948, is now well established and is making a substantial contribution to education in the Army.

15. The Army continues to provide educational facilities for the children of Servicemen in theatres overseas where suitable civilian schools do not exist. This commitment is steadily growing as the number of Service families overseas increases. A system of secondment for civilian teachers to Army children's schools overseas has, with the help of the Ministry of Education, been successfully introduced.

16. The total provision for Army education is shown in Appendix V of the Estimates.

WELFARE

17. In spite of difficult conditions in many overseas theatres, the general standard of welfare of the troops has been well maintained. All Commands have devoted special attention to the national serviceman.

18. The voluntary philanthropic organisations—the Soldiers', Sailors', and Airmen's Families' Association, the Forces Help Society, the Officers' Families' Fund and the Women's Voluntary Services—have continued to give most valuable assistance.

RESETTLEMENT

19. The closest liaison has been maintained with the Ministry of Labour in regard to the arrangements for the resettlement of officers and men leaving the Army, and considerable progress has been made with measures to ensure that ex-Service men are found employment in civilian life commensurate with their age and experience on leaving the Army. This is a matter to which I attach very great importance, not only because it is clearly our duty to help those who serve their country in the armed forces to find appropriate employment on return to civil life, but also because success in this field should materially assist Regular Army recruiting.

HEALTH OF THE ARMY

20. The health of the Army during 1949 has been good. Except in the United Kingdom, where there was a slight increase which was caused by influenza in the spring of 1949, the amount of sickness in all Commands has been less than in 1948. It is particularly gratifying that this should have been so in spite of active operations in Malaya and the difficult conditions in Hong Kong due to reinforcement of the garrison. Steady improvement in the health of the troops has been particularly marked in West Africa.

21. In the Middle East and Far East malaria, once the cause of so much manpower wastage in tropical and sub-tropical climates, was responsible for little more than one case per thousand troops per month. During the year paludrine came into general use in replacement of mepacrine as a prophylactic, and the results have been satisfactory. Paludrine is more popular with troops and their families than was mepacrine. The incidence of enteric fever was also very low in almost all theatres. Such outbreaks as have occurred have almost invariably been found to be due to carriers in the native populations, and special measures are being taken to combat this danger.

22. Further efforts have been made to improve the standard of health education in the Army, and a new film on communal health called "Health in our Time" was completed during the year.

TRAINING

23. The training of the national serviceman has been carried out during 1949 in accordance with the principles set out in the Memorandum relating to the Army Estimates for 1949–50, special measures being taken to give a higher standard of training to recruits for the Regular Army and to national servicemen posted to the Far East. Training during 1950 will continue on the same lines with some minor modifications, based on experience; in particular, the aim will be to achieve higher standards of marksmanship and individual skill in the use of personal weapons.

24. *United Kingdom.*—During 1949 it was possible, for the first time since the war, to carry out in the United Kingdom collective training by a groups of all arms. This gave valuable experience and revealed marked keenness on the part of all concerned, and especially of national servicemen. Similar collective training will be carried out in 1950 on a larger scale.

25. *British Army of the Rhine and Western Union.*—Considerable benefit and valuable experience was derived from divisional exercises carried out in Germany by the British Army of the Rhine in conjunction with the Royal Air Force and forces from the other Occupying Powers. Similar exercises are planned for the coming year. Arrangements have also been made with the Armies of other Western Union Powers for the interchange of personnel for training, and this development will continue in 1950.

26. *Middle East.*—Though some collective training in formations larger than units was possible during 1949, opportunities for such training were severely limited by the dispersion of our forces in this theatre due to the heavy commitments which they have to carry.

27. *Far East.*—I am much encouraged by the adaptability, keenness, and military capacity revealed by young soldiers, and especially by national servicemen, both in Hong Kong and Malaya, in training and in operations against bandits in Malaya. The way these men have met the difficult and testing conditions inseparable from present conditions in Malaya, has drawn universal praise from all commanding officers of units and higher formations.

28. *Civil Defence.*—In conjunction with the Home Office and other civil authorities, a number of studies and indoor exercises have been arranged dealing with problems relating to the role of the Army in civil defence in the event of war; and it is proposed to develop this aspect of Army training in the coming year. The liaison arrangements with the Home Office and other civil authorities in this important field are working well.

29. *Territorial Army.*—Approximately 95 per cent. of the strength of the Territorial Army attended annual camps during 1949 at which unit training was the main feature. In 1950 annual camps of most field force units in the Territorial Army will be on a Brigade Group basis with emphasis on the collective training of all arms together.

30. During 1949 great strides have been made in training the volunteer cadres which are preparing to receive the first of the national servicemen to enter the Territorial Army after completing 18 months' service with the Regular Army. The final stages of such training will be completed in 1950 and its effectiveness will be put to the test from July onwards. The out-of-camp training of the volunteer cadres has been directed primarily to the individual training of officers and non-commissioned officers as instructors; but there have also been courses and exercises, arranged both by Commands and by the War Office, to give higher training to officers.

31. *Cadet Forces.*—The scope of training in the Cadet Forces has been widened during 1949 with a view to increasing its value to the Cadets when they enter their period of National Service with the Regular Army. To secure further improvements in the standard of instruction given in the Cadet Forces some of the national service officers due to leave the Regular Army in 1950 will be allowed to serve with Cadet units in fulfilment of their National Service obligation for part-time service.

SUPPLEMENTARY RESERVE

32. Approximately a fifth of the national servicemen who complete their service with the Active Army and who are likely to be more effective in the

Supplementary Reserve than in the Territorial Army, because of specialist qualifications, the location of their homes, or for other reasons, will carry out their part-time training in the Supplementary Reserve. The obligation of 60 days' training will normally be met by 15 days' training under Active Army supervision in each of the four years subsequent to completing their full-time service; and in this respect they will differ from the national servicemen in the Territorial Army, who will normally complete their training in the first three years by undergoing 20 days' training in each year.

TERRITORIAL ARMY

33. The year 1950 will see the beginning of a new phase in the development of the reconstituted Territorial Army, for in July there will enter the first of the national servicemen with an obligation to serve in that Army for four years after 18 months' service with the Active Army. None of these will be required to attend annual camp with the Territorial Army until 1951, but their new units must adapt themselves to absorbing them from July 1950 onwards.

34. In anticipation of their arrival, a detailed examination of the Order of Battle for the Territorial Army has been undertaken, in order that, before the first national servicemen join their Territorial Army units, any necessary modifications may be made.

35. In order to avoid undue strain on the receiving Territorial Army units, batches of national servicemen will pass to the Territorial Army every fortnight. They will be given an opportunity, before the completion of their service with the Active Army, to choose the Territorial Army unit with which they would prefer to serve; and any who are willing to undertake the full liability of volunteer members of the Territorial Army will be given priority over those who do not so volunteer in postings to the unit of their choice. In all cases the aim will be to post men to a Territorial Army unit in the neighbourhood of their homes and, wherever possible, to a unit of the same arm as that in which they have served with the Active Army.

36. The strength of the Territorial Army on December 31, 1949, was 82,533, as compared with a strength of 67,210 on the corresponding date last year. I am glad to record that the officer position is satisfactory and that we have many officers of high quality and with considerable war experience. On the other hand, a number of young officers who have completed National Service with the Active Army under the transitional scheme (and who have, therefore, no obligation to serve in the Territorial Army) are volunteering for it, as is also a small but gradually increasing number of other ranks. There is still a need for more men with war experience who would make good serjeants to lead national service men in Territorial Army units as these build up to their full strength over the next four years.

37. In 1949, 150 additional Territorial Army centres were provided and arrangements are in hand to provide further centres up to the full number which will be ultimately required. This has involved considerable additions to the accommodation at pre-1939 drill halls, e.g. for garages, in order that they may meet the up-to-date requirements of units.

CADET FORCES

38. The Cadet Forces continue to prove their great value to the military forces, as will be evident from the figures quoted in succeeding paragraphs. These figures are reinforced by the reports received from the commanding officer of units receiving ex-cadets as national servicemen. A number of cadets on completing full-time National Service with the Active Army are volunteering to be officers in their old cadet units or in affiliated Territorial Army units, a fact which reveals that the Cadet Forces already have a tradition and *esprit de corps*, which will, it is hoped, steadily grow.

39. *Combined Cadet Force.*—The strength of the Combined Cadet Force on July 31, 1949, was approximately 1,300 officers and 53,500 cadets in 325 schools of all types at which pupils remain until the age of 17 or over. More than two-thirds of the officer cadets training for commissions in the Regular Army, as well as approximately two-thirds of officer cadets training for commissions as national service officers, are ex-members of the Combined Cadet Force.

40. *Army Cadet Force.*—The strength on July 31, 1949, was approximately 7,000 officers and 76,000 cadets. Some 14·5 per cent. of all officer cadets in training for commissions in the Regular Army, or as national service officers, are ex-members of the Army Cadet Force. Other ex-cadets generally qualify quickly on joining the Active Army to become non-commissioned officers, which goes far to ensure a supply of good warrant officers and senior non-commissioned officers for the Territorial Army in future years.

ARMAMENTS AND STORES

41. Approximately one-half of the estimated expenditure on armaments and stores relates to the provision of modern types of armament, new vehicles, and modernization of existing equipments. This provision represents a further phase, both in the modernization of the Army equipment as a whole and also in fitting the Army to discharge its responsibilities under Western Union. The other half is for normal maintenance of the Army and for the improvement of living conditions in barrack rooms, quarters, and messes.

42. The first year of the Ministry of Supply programme for rebuilding wheeled vehicles for the Army has been completed, and some 10,000 vehicles have been rebuilt. Rebuilding will continue in 1950–51, and the work done by the Ministry of Supply will be supplemented by rebuilding substantial numbers of vehicles in Army workshops in the United Kingdom and Germany.

WORKS

43. Much still remains to be done—both at home and abroad—before the standard of accommodation for officers and men can be regarded as satisfactory; the major part of the provision made for works services is, therefore, for maintaining and improving existing accommodation and adding thereto.

44. *Home.*—Apart from maintenance, expenditure will continue to be directed mainly towards the improvement of living accommodation for

single soldiers. Satisfactory progress has been made on the modernisation of the permanent barracks at Tidworth and plans are in an advanced stage for other permanent accommodation projects.

45. The passing of the Armed Forces (Housing Loans) Act, 1949, enables the rate at which married quarters at home are being provided to be increased. The loans available under the Act enable more of the limited sum available for Army works services to be diverted to the provision of married quarters accommodation abroad.

46. *Abroad.*—Progress in the construction of more permanent accommodation has been retarded by uncertainty as to the size and final location of permanent overseas garrisons. It has also been necessary during the past year to divert effort from permanent construction to provide temporary accommodation for the additional troops sent to meet the special circumstances at present prevailing in Hong Kong and Malaya.

WAR AFTERMATH TASKS

47. The Memorandum relating to the Army Estimates for 1949–50 referred to the tasks that remain as an aftermath of war, which are additional to the Army's normal peace-time commitments.

48. Work on these tasks, which falls mainly on the administrative staffs and services, continues, but the end of some of them is in sight. We hope to complete the clearance of battle training areas before the end of 1950, and bomb disposal and beach mine clearance should be finished about two years from now.

49. On the other hand the maintenance of married families' hostels and the task of dumping unstable ammunition are examples of abnormal commitments that may last longer. There is likely to be a considerable reduction during the next few years in the manpower required for the former task, which should ultimately disappear.

JOHN STRACHEY

THE WAR OFFICE,
2 *March* 1950

ABSTRACT OF ARMY

Vote	Service	Estimates, 1950–51		
A	Maximum number of officers and other ranks to be maintained for Army Service			467,000
		Gross Estimate	Appropriations in aid	Net Estimate
		£	£	£
1	Pay, etc., of the Army	94,350,000	9,720,000	84,630,000
2	Reserve Forces, Territorial Army and Cadet Forces	11,155,000	110,000	11,045,000
3	War Office	2,347,000	52,000	2,295,000
4	Civilians	45,935,000	1,330,000	44,605,000
5	Movements..	22,000,000	350,000	21,650,000
6	Supplies, etc.	43,670,000	10,650,000	33,020,000
7	Stores	68,220,000	10,400,000	57,820,000
8	Works, buildings, and lands ..	29,250,000	3,905,000	25,345,000
9	Miscellaneous effective services ..	4,143,000	2,110,000	2,033,000
10	Non-effective services	16,630,000	73,000	16,557,000
11	Additional married quarters ..	3,900,100	3,900,000	100
	Total .. .. .. £	341,600,100	42,600,000	299,000,100

ESTIMATES, 1950–51

Estimates, 1949–50			Difference on Net Estimates		Vote
		550,000	Decrease 83,000		A
Gross Estimate	Appropriations in Aid	Net Estimate	Increase	Decrease	
£	£	£	£	£	
103,357,000	9,100,000	94,257,000	—	9,627,000	1
12,570,000	110,000	12,460,000	—	1,415,000	2
2,390,000	50,000	2,340,000	—	45,000	3
47,970,000	1,510,000	46,460,000	—	1,855,000	4
23,000,000	350,000	22,650,000	—	1,000,000	5
46,650,000	12,840,000	33,810,000	—	790,000	6
69,250,000	19,250,000	50,000,000	7,820,000	—	7
28,900,000	5,300,000	23,600,000	1,745,000	—	8
6,370,000	2,940,000	3,430,000	—	1,397,000	9
15,743,000	50,000	15,693,000	864,000	—	10
—	—	—	100	—	11
356,200,000	51,500,000	304,700,000	10,429,100	16,129,000	

Net decrease £5,699,900

JOHN STRACHEY
MICHAEL STEWART

W. J. SLIM, *C.I.G.S.*
J. S. STEELE, *A.G.*
S. C. KIRKMAN, *Q.M.G.*
N. C. D. BROWNJOHN, *V.C.I.G.S.*
J. F. M. WHITELEY, *D.C.I.G.S.*

G. W. TURNER

The War Office,
6 *March* 1950

MEMORANDUM BY THE SECRETARY OF STATE FOR AIR TO ACCOMPANY AIR ESTIMATES FOR 1950–51

(Cmd. 7898)

PREFACE

1. The net total of Air Estimates for 1950–51 is £223,000,000. Provision is made also for a maximum of £4,900,000 to be issued out of the Consolidated Fund, under the Armed Forces (Housing Loans) Act, 1949, for the construction of additional married quarters.

2. The Estimate is £15,550,000 more than in 1949–50. The main increase is due to the introduction of more modern types of aircraft and equipment (including radar) and to the gradual exhaustion of our war-time stocks of equipment. There is also increased provision for the development of airfields to meet modern requirements and for the building of additional domestic and technical accommodation.

GENERAL

3. Now that the worst effects of post-war demobilisation have been overcome, the Royal Air Force is better able to concentrate on measures of a constructive kind to improve its efficiency as a fighting force.

4. The uniformed strength of the force will fall to about 198,000 by the end of 1950–51, compared with 225,000 a year ago and 202,000 today, a decrease in the two years of 12 per cent. During the same period, however, the fighting strength of the force shows a rising curve. The expansion of the front line which I announced in March last has been started and is being continued in 1950–51.

5. This is being achieved partly by the continuous efforts that have been made to achieve economy and improved efficiency in the use of manpower, and partly by closing or reducing in size some units and formations desirable in themselves but less essential than front-line combat strength. Thus, the transport force in the United Kingdom has been reduced; the Central Bomber Establishment has been abolished and its duties allocated to bomber squadrons; and the Empire Schools have been amalgamated into the Royal Air Force Flying College. Substantial reductions are being made in Technical Training Command by the use of improved methods; and in Maintenance Command by reducing the holdings of older types of equipment. The staffs of the Air Ministry and of Command and Group Headquarters have been cut, and there has been a general pruning of establishments elsewhere.

6. As a result of these measures the necessary manpower is being found to complete the doubling of the jet fighter strength of Fighter Command, and to make a considerable increase in the striking power of Bomber Command by forming new squadrons equipped with B.29 aircraft which are being supplied under the Mutual Defence Assistance Programme. In addition, the radar system of the United Kingdom—which is, of course, a vital element in our air defences—will be materially strengthened.

7. A number of important operations have been carried out during the past year. Transport Command and the British Air Forces of Occupation continued to play their part in the airlift to Berlin until its termination last October. The Far East Air Force has been engaged, in co-operation with the Army and the civil authorities, in operations against the bandits in Malaya. This work has included air strikes, reconnaissance and the air supply of isolated detachments in the jungle. In addition, Royal Air Force reinforcements have been sent to Hong Kong. A flying-boat of the Far East Air Force brought medical assistance under fire to H.M.S. Amethyst when she was attacked in the Yangtse. The Middle East Air Force has helped to maintain internal security in Eritrea and Italian Somaliland and in the Aden Protectorate.

8. Several major training exercises have taken place during the year. The most important exercises involving the Metropolitan Air Force were Exercise "Foil," which was designed to test the air defences of the United Kingdom; Exercise "Bulldog," whose object was to practise the air striking force in attacks against a highly organised defensive system; and the Allied Fleet Exercise "Verity," in which Bomber and Coastal Commands took part. The British Air Forces of Occupation co-operated with allied armies and air forces in a large scale exercise in Germany, and the Middle East Air Force and the Royal Egyptian Air Force joined in air defence exercises in the Canal Zone. The routine training exercises in the Middle East by squadrons from Bomber Command have been continued throughout the year; and No. 210 Squadron of Coastal Command visited Singapore, where it took part in operations against bandits in Malaya, in addition to carrying out exercises with warships of the Far East Fleet.

9. In these exercises, the co-operation of air forces of other countries has played an increasingly important part, and the Royal Air Force has continued in many other ways to strengthen its links with other Commonwealth air forces and with allied and other friendly air forces. Crews from the Australian, New Zealand, and South African air forces took part in the Berlin Air Lift. An offer by the Royal New Zealand Air Force to make available a flight of Dakotas to assist in communications between Singapore and Hong Kong was gladly accepted. Flying-boats of the Royal New Zealand Air Force have changed places for a period with flying-boats of No. 88 Squadron of the Far East Air Force. Medium bomber groups of the United States Air Force stationed in this country since July 1948 exercise continually with the Royal Air Force and have been joined on occasion by United States Air Force jet fighters from Germany. The following overseas visits have been made by Royal Air Force squadrons: No. 120 (Lancaster G.R.) Squadron to Canada; No. 9 (Lincoln) Squadron to Pakistan; No. 32 (Vampire) Squadron to Turkey, in return for a visit by a Turkish squadron to Cyprus; No. 73 (Vampire) Squadron to Italy; and Meteors from Nos. 66 and 92 Squadrons to Sweden and Norway. A very successful joint training exercise was carried out by a squadron of the Royal Iraqi Air Force with the Royal Air Force at Habbaniya. Further measures of co-operation include the continued and increased exchange of officers with the air forces of other Commonwealth countries and with the United States of America, and the exchange of ideas designed to standardise air equipment, techniques, and procedures.

10. Among other tasks carried out by the Royal Air Force were the evacuation of 120 British civilians from Shanghai in Sunderland flying-boats, and the continuance of photographic survey work for other government departments in this country and Africa. Various flights have been undertaken for scientific purposes, and a small detachment of the Royal Air Force played a valuable part in the British-Scandinavian expedition to Queen Maud Land in the Antarctic.

PERSONNEL

11. Regular recruiting is still far from satisfactory. There is a shortage of trained men, and a lack of balance between trades persists. Although surpluses have been eliminated or reduced in a number of trades, there are serious deficiencies in some of the most important and highly skilled trades.

12. The new schemes introduced in September 1948 for the entry of flying personnel are now yielding results, and although requirements have not been met, there has been some improvement in the intake. There is still, however, a shortage of suitable applicants for short-service commissions as pilots and navigators. The first pupils entered under the scheme introduced last year for giving pilot training to 300 national service men a year began their training in March 1949, and sufficient candidates of the right quality are coming forward. A number of national service men have also volunteered and been accepted for regular aircrew engagements.

13. It has recently been decided to introduce two new forms of regular engagement to enable national service airmen to serve for periods which, while not entailing longer total service than the 5½ years laid down in the National Service Acts, 1948, provide for a longer term of whole-time and a shorter term of part-time service than those prescribed in the Acts. It will be possible for men who undertake these new engagements to give more productive service overseas than is practicable during the 18 months of a national service engagement, and I hope that the problem of manning the regular Air Force will thus be materially assisted.

14. There has been an encouraging improvement in the numbers and quality of candidates for Royal Air Force cadetships at the Royal Air Force College, Cranwell. The build-up of the peace-time permanent officer cadre, which is found not only from direct entrants through Cranwell and the Universities, but also from officers serving on extended service, short service and temporary commissions, and from regular airmen, is now well on the way to completion, but the need remains for a continued supply of candidates of high quality for permanent commissions.

15. The Women's Royal Air Force, which came into being on February 1, 1949, in place of the Women's Auxiliary Air Force, is doing good work as a permanent and integral part of the Service. It is intended that women should take their full share of overseas service in all suitable Commands and members of the Women's Royal Air Force are now giving valuable service in Germany, the Middle East and the Far East.

16. Satisfactory progress has been made during the year in providing further education for national service entrants and for other airmen and airwomen. Instruction in general educational subjects and lectures on

current affairs and citizenship are provided. Airmen and airwomen who are still in their first or second year of service receive instruction during working hours. Improved facilities are available to airmen and airwomen to pursue their education on a voluntary basis by attending classes organised on the station or in service technical schools and similar civil institutions.

17. I am glad to be able to state that the demand from industry for experienced tradesmen of the Royal Air Force remains high. A recent count showed the percentage of ex-regular airmen resettled in civil employment to be as high as 99 per cent.

AUXILIARY AND RESERVE FORCES

18. The 20 fighter squadrons of the Royal Auxiliary Air Force are now a part of Fighter Command. Seven of the squadrons have been completely re-armed with jet aircraft and other squadrons will receive them during the coming year. Fighter control units of the Royal Auxiliary Air Force will also shortly be taking their place in Fighter Command as an integral and essential part of the system of air defence of this country.

19. Five air observation post squadrons, which are units manned jointly by the Territorial Army and the Royal Auxiliary Air Force, and a number of air traffic control sections, which train with the fighter squadrons, have been added to the Royal Auxiliary Air Force during recent months.

20. The fighter squadrons, the fighter control units, and the Regiment squadrons of the Royal Auxiliary Air Force went to summer camp and most of these units took part in the main Royal Air Force exercises and in many smaller exercises during the year.

21. Members of the Royal Observer Corps carried out their usual training during the year and manned sectors of the control and reporting system during the various defence exercises, gaining valuable experience.

22. The Air Training Corps and the Royal Air Force sections of the Combined Cadet Force continue to provide a strong and valuable pre-entry organisation. In the gliding schools during 1949 about 2,200 cadets qualified for the Royal Aero Club certificate and the badge awarded by the Fédération Aëronautique Internationale.

WORKS

23. Provision has been made for airfields to be extended and strengthened to fit them for use by new types of aircraft, for improvement of barracks and messes, for further replacement of temporary war-time accommodation, and for a substantial increase in married quarters. In the first 10 months of the financial year 1949–50, nearly 1,400 permanent married quarters were completed and some 500 temporary quarters were constructed from hutting. About 2,250 quarters are now under construction. By taking full advantage of the Armed Forces (Housing Loans) Act, 1949, it is hoped during the next few years to double the rate of building in this country and to make a start on a building programme during the year of 4,000 permanent married quarters at home. Overseas, it is planned to start a further 530 during the year.

SUPPLY

24. The re-equipment and expansion of day fighter squadrons with jet aircraft is continuing. A jet fighter (the Venom) of superior performance to the Vampire will also be introduced. The new jet bomber, the Canberra—which promises to be an outstanding aircraft—has been ordered in quantity and deliveries should begin during the year. Hastings and Valettas are replacing in our transport squadrons the Yorks and Dakotas which have done such good service in the past years. Further progress will be made with the replacement of existing types of training aircraft by greatly improved modern types. The production programme includes the manufacture of a substantial number of jet aircraft for use in Western Union defence.

METEOROLOGY

25. While continuing to meet the requirements of the Royal Air Force and the Ministry of Civil Aviation and other government departments, the Meteorological Office has extended the service it renders to the economic life of the country and to the public generally. The Railway Executive, gas boards, electricity supply boards, and others have arrangements for obtaining regular forecasts for their specialised needs. Agricultural, fishery, and shipping interests are supplied with forecasts through the British Broadcasting Corporation and other channels. A regular weather service is now provided by television.

26. An international agreement for the maintenance of ocean weather ships in the North Atlantic was signed in London in May 1949, replacing the 1946 agreement. The United Kingdom continued to be responsible for two stations with assistance from Holland for one of them. Besides fulfilling their primary role of weather reporting stations, our weather ships during 1949 answered 4,000 requests from trans-Atlantic aircraft for weather and position information.

ARTHUR HENDERSON

AIR MINISTRY,
March 1, 1950

ABSTRACT OF AIR

Vote	Service	ESTIMATES, 1950–51		
A	Maximum number of officers, airmen, and airwomen to be maintained for Air Force service			215,000
		Gross estimate	Appropriations in aid	Net estimate
		£	£	£
1	Pay, etc., of the Air Force ..	54,310,000	1,460,000	52,850,000
2	Reserve and Auxiliary services ..	1,444,000	1,100	1,442,900
3	Air Ministry	2,976,000	118,000	2,858,000
4	Civilians at outstations	19,720,000	568,000	19,152,000
5	Movements..	9,250,000	800,000	8,450,000
6	Supplies	32,193,000	4,293,000	27,900,000
7	Aircraft and stores..	95,500,000	17,500,000	78,000,000
8	Works and lands	30,000,000	3,560,000	26,440,000
9	Miscellaneous effective services ..	2,722,000	1,160,000	1,562,000
10	Non-effective services	4,437,000	92,000	4,345,000
11	Additional married quarters ..	4,900,100	4,900,000	100
	Total .. .. .. £	257,452,100	34,452,100	223,000,000

ARTHUR HENDERSON
GEOFFREY DE FREITAS

J. C. SLESSOR
L. N. HOLLINGHURST

Air Ministry,
March 1, 1950

ESTIMATES, 1950–51

Estimates, 1949–50			Differences on Net Estimates		Vote
				Decrease	
		255,000		40,000	A
Gross Estimate	Appropriations in Aid	Net Estimate	Increase	Decrease	
£	£	£	£	£	
56,950,000	1,750,000	55,200,000	—	2,350,000	1
1,300,300	300	1,300,000	142,900	—	2
2,894,800	111,800	2,783,000	75,000	—	3
21,148,600	439,000	20,709,600	—	1,557,600	4
9,230,000	660,000	8,570,000	—	120,000	5
29,381,000	3,341,000	26,040,000	1,860,000	—	6
82,500,000	18,000,000	64,500,000	13,500,000	—	7
26,700,000	3,872,000	22,828,000	3,612,000	—	8
3,419,400	1,000,000	2,419,400	—	857,400	9
3,167,500	67,500	3,100,000	1,245,000	—	10
—	—	—	100	—	11
236,691,600	29,241,600	207,450,000	20,435,000	4,885,000	

Net increase £15,550,000

G. C. PIRIE   A. P. M. SANDERS   J. H. BARNES
R. VICTOR GODDARD   W. A. CORYTON

NORTH ATLANTIC TREATY

(Cmd. 7657)

PREAMBLE

The Parties to this Treaty reaffirm their faith in the purposes and principles of the Charter of the United Nations and their desire to live in peace with all peoples and all Governments.

They are determined to safeguard the freedom, common heritage, and civilisation of their peoples, founded on the principles of democracy, individual liberty and the rule of law.

They seek to promote stability and well-being in the North Atlantic area.

They are resolved to unite their efforts for collective defence for the preservation of peace and security.

They therefore agree to this North Atlantic Treaty.

ARTICLE 1

The Parties undertake, as set forth in the Charter of the United Nations, to settle any international disputes in which they may be involved by peaceful means in such a manner that international peace and security and justice are not endangered, and to refrain in their international relations from the threat or use of force in any manner inconsistent with the purposes of the United Nations.

ARTICLE 2

The Parties will contribute toward the further development of peaceful and friendly international relations by strengthening their free institutions, by bringing about a better understanding of the principles upon which these institutions are founded, and by promoting conditions of stability and well-being. They will seek to eliminate conflict in their international economic policies and will encourage economic collaboration between any or all of them.

ARTICLE 3

In order more effectively to achieve the objectives of this Treaty, the Parties, separately and jointly, by means of continuous and effective self-help and mutual aid, will maintain and develop their individual and collective capacity to resist armed attack.

ARTICLE 4

The Parties will consult together whenever, in the opinion of any of them, the territorial integrity, political independence or security of any of the Parties is threatened.

ARTICLE 5

The Parties agree that an armed attack against one or more of them in Europe or North America shall be considered an attack against them all and consequently they agree that, if such an armed attack occurs, each of them, in exercise of the right of individual or collective self-defence recognised by Article 51 of the Charter of the United Nations, will assist the Party or Parties so attacked by taking forthwith, individually and in concert with the other Parties, such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area.

Any such armed attack and all measures taken as a result thereof shall immediately be reported to the Security Council. Such measures shall be terminated when the Security Council has taken the measure necessary to restore and maintain international peace and security.

ARTICLE 6

For the purpose of Article 5 an armed attack on one or more of the Parties is deemed to include an armed attack on the territory of any of the Parties in Europe or North America, on the Algerian Departments of France, on the occupation forces of any Party in Europe, on the islands under the jurisdiction of any Party in the North Atlantic area north of the Tropic of Cancer or on the vessels or aircraft in this area of any of the Parties.

ARTICLE 7

This Treaty does not affect, and shall not be interpreted as affecting, in any way the rights and obligations under the Charter of the Parties which are members of the United Nations, or the primary responsibility of the Security Council for the maintenance of international peace and security.

ARTICLE 8

Each Party declares that none of the international engagements now in force between it and any other of the Parties or any third State is in conflict with the provisions of this Treaty, and undertakes not to enter into any international engagement in conflict with this Treaty.

ARTICLE 9

The Parties hereby establish a Council, on which each of them shall be represented, to consider matters concerning the implementation of this Treaty. The Council shall be so organised as to be able to meet promptly at any time. The Council shall set up such subsidiary bodies as may be necessary; in particular it shall establish immediately a Defence Committee which shall recommend measures for the implementation of Articles 3 and 5.

ARTICLE 10

The Parties may, by unanimous agreement, invite any other European State in a position to further the principles of this Treaty and to contribute to the security of the North Atlantic area to accede to this Treaty. Any State so invited may become a Party to the Treaty by depositing its instrument of accession with the Government of the United States of America.

The Government of the United States of America will inform each of the Parties of the deposit of each such instrument of accession.

ARTICLE 11

This Treaty shall be ratified and its provisions carried out by the Parties in accordance with their respective constitutional processes. The instruments of ratification shall be deposited as soon as possible with the Government of the United States of America, which will notify all the other signatories of each deposit. The Treaty shall enter into force between the States which have ratified it as soon as the ratifications of the majority of the signatories, including the ratifications of Belgium, Canada, France, Luxembourg, the Netherlands, the United Kingdom, and the United States have been deposited and shall come into effect with respect to other States on the date of the deposit of their ratifications.

ARTICLE 12

After the Treaty has been in force for ten years, or at any time thereafter, the Parties shall, if any of them so requests, consult together for the purpose of reviewing the Treaty, having regard for the factors then affecting peace and security in the North Atlantic area, including the development of universal as well as regional arrangements under the Charter of the United Nations for the maintenance of international peace and security.

ARTICLE 13

After the Treaty has been in force for twenty years, any Party may cease to be a Party one year after its notice of denunciation has been given to the Government of the United States of America, which will inform the Governments of the other Parties of the deposit of each notice of denunciation.

ARTICLE 14

This Treaty, of which the English and French texts are equally authentic, shall be deposited in the archives of the Government of the United States of America. Duly certified copies thereof will be transmitted by that Government to the Governments of the other signatories.

BRITISH AND FOREIGN ARMED FORCES

PRINCIPAL OFFICIALS

On March 1, 1950

GREAT BRITAIN

Minister of Defence: The Rt. Hon. E. Shinwell, M.P.

Chief Staff Officer: Air Marshal Sir William Elliot, K.B.E., C.B., D.F.C.

Board of Admiralty

First Lord: The Rt. Hon. Viscount Hall.

First Sea Lord and Chief of Naval Staff: Admiral of the Fleet Rt. Hon. Baron Fraser of North Cape, G.C.B., K.B.E.

Second Sea Lord and Chief of Naval Personnel: Admiral Sir Cecil H. J. Harcourt, K.C.B., C.B.E.

Third Sea Lord and Controller: Vice-Admiral M. M. Denny, C.B., C.B.E., D.S.O.

Fourth Sea Lord and Chief of Supplies and Transport: Vice-Admiral Herbert A. Packer, C.B., C.B.E.

Fifth Sea Lord and Deputy Chief of Naval Staff (Air): Vice-Admiral M. J. Mansergh, C.B., C.B.E.

Vice-Chief of Naval Staff: Vice-Admiral Sir George Creasy, K.C.B., C.B.E., D.S.O., M.V.O.

Assistant Chief of Naval Staff: Rear-Admiral Ralph A. B. Edwards, C.B.E.

Civil Lord: Walter J. Edwards, Esq., M.P.

Parliamentary and Financial Secretary: L. J. Callaghan, Esq., M.P.

Permanent Secretary: Sir John G. Lang, K.C.B.

Army Council

President, Secretary of State for War: The Rt. Hon. E. J. St. L. Strachey, M.P.

Vice-President, Parliamentary Under Secretary of State for War, and Financial Secretary of the War Office: R. M. M. Stewart, Esq., M.P.

First Military Member, Chief of the Imperial General Staff: Field Marshal Sir William J. Slim, C.G.B., G.B.E., D.S.O., M.C.

Second Military Member, Adjutant General to the Forces: General Sir James S. Steele, K.C.B., K.B.E., D.S.O., M.C., LL.D.

Third Military Member, Quarter-Master General to the Forces: General Sir Sidney C. Kirkman, K.C.B., K.B.E., M.C.

Fourth Military Member, Vice Chief of the Imperial General Staff: Lieutenant-General N. C. D. Brownjohn C.B., C.M.G., O.B.E., M.C.

Fifth Military Member, Deputy Chief of the Imperial General Staff: Lieutenant-General Sir John F. M. Whiteley, K.C.B., C.B.E., M.C.

Permanent Under-Secretary of State for War: Sir George W. Turner, K.C.B., K.B.E.

Air Council

Secretary of State for Air and President of the Air Council: The Rt. Hon. Arthur Henderson, K.C., M.P.

Parliamentary Under-Secretary of State for Air and Vice-President of the Air Council: Aidan M. Crawley, M.P.

Chief of the Air Staff: Air Chief Marshal Sir John C. Slessor, G.C.B., D.S.O., M.C.

Air Member for Personnel: Air Marshal Sir Leslie N. Hollinghurst, K.C.B., K.B.E., D.F.C.

Air Member for Supply and Organisation: Air Marshal Sir William F. Dickson, K.B.E., C.B., D.S.O., A.F.C.

Air Member for Technical Services: Air Marshal Sir R. Victor Goddard, K.C.B., C.B.E.

**Vice-Chief of the Air Staff:* Air Chief Marshal The Hon. Sir Ralph A. Cochrane, K.C.B., K.B.E., A.F.C., *A.D.C.*

**Deputy Chief of the Air Staff:* Air Marshal Sir Arthur P. M. Sanders, K.B.E., C.B.

**Controller Supplies (Air):* Air Marshal Sir W. Alec Coryton, K.C.B., K.B.E., M.V.O., D.F.C.
(*Ministry of Supply*)

Permanent Under-Secretary of State for Air: Sir James H. Barnes, K.C.B., K.B.E

* Additional Member.

PRINCIPAL OFFICIALS OF ARMED FORCES

COMMONWEALTH

	Minister of Defence	Minister for Navy	C.O.S.	Minister for Army	C.O.S.	Minister for Air	C.O.S.
Australia	E. H. Harrison	J. Francis[*]	Rear-Admiral J. A. Collins, R.A.N.	J. Francis[*]	Lieut.-General S. F. Rowell	Group Captain Hon. T. W. White	Air Marshal G. Jones
Canada	B. Claxton	—	Vice-Admiral H. T. W. Grant, R.C.N.	—	Lieut. - General C. Foulkes	—	Air Marshal W. A. Curtis
Ceylon	D. S. Senanayake[†]	—	—	—	Lieut.-Col. A. Muttucumaru	—	—
India	Sardar Baldev Singh	—	Vice-Admiral Sir W. E. Parry, R.N.E.	—	General K. M. Cariappa	—	Air Marshal R. Ivelaw - Chapman
New Zealand . .	T. L. McDonald	—	Commodore G. W. G. Simpson, R.N.	—	Major - General K. L. Stewart	—	Air Vice-Marshal Sir Arthur Nevill
Pakistan	Liaquat Ali Khan[†]	—	Commodore H. M. S. Chodri	—	Lieut. - General R. C. McCay	—	Air Vice-Marshal R. L. R. Atcherley
South Africa . .	F. C. Erasmus	—	Commodore F. J. Dean	—	Major-General L. C. du Toit	—	Brigadier J. T. Durrant[‡]

[*] Minister of State for Army and Navy.

[†] And Prime Minister.

[‡] Director-General, South African Air Force.

PRINCIPAL OFFICIALS OF ARMED FORCES

U.S.A. AND ATLANTIC PACT COUNTRIES OF WESTERN EUROPE

Country	Minister of Defence	Minister for Navy	C.O.S.	Minister for Army	C.O.S.	Minister for Air	C.O.S.
U.S.A.	Louis A. Johnson	F. P. Matthews	Admiral F. P. Sherman	Gordon Gray	General J. Lawton Collins	Thomas K. Finletter	General Hoyt Vandenberg
Belgium	M. Albert Deveze	—	Commander L. J. Robins	—	Lieut. - General E. Baele	—	General Major Aviateur Lucien Leboutte
Denmark	M. Rasmus Hansen	Vice-Admiral A. H. Vedel*	Rear-Admiral K. Lundsteen	—	Major - General E. Möller	—	Colonel T. P. A. Qrum
France	M. Rene Pleven	M. Raymond-Laurent	Admiral A. G. Lemonnier	M. Paul Ramadier	General de Corps d'Armée C. Blanc	M. André Maroselli	General d'Armée Aerienne C. F. Lecheres
Italy	Sr. Randolphe Pacciardi	—	Admiral Emilio Perreri	—	Lieut. - General E. Marras	—	Lieut. - General Mario Aimone-Cat
Luxembourg ..	Pierre Dupong	—	—	Colonel Jacoby	Colonel A. Jacoby	—	—
Netherlands ..	Mr. W. F. Schokking	Rear-Admiral C. W. Moorman	Vice-Admiral E. J. Van Holthe	—	General H. Kruls	—	Lieut. - General Giebel
Norway	M. Jens Chr. Hauge	Vice-Admiral E. C. Danielsen, C.B.E.	Commodore G. Hovdenak, O.B.E.	—	Lieut - General W. Hansteen	—	Colonel Odd Bull
Portugal	—	Captain A. Tomaz	Rear - Admiral Cunha Gomez	Lieut.-Col. Fernando dos Santos Costa	General J. de Barros Rodriguez	—	General Alfredo Cintra

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* C.-in-C. of Navy.

BRITISH AND COMMONWEALTH LIAISON OFFICERS

BRITISH

	Naval	Army	Air
Australia ..	Rear-Admiral C. T. M. Pizey, Head of U. K. Services Mission in Australia	Major-General A. J. H. Cassels	Group Captain H. W. Mermagen
Canada ..	Captain Sir Robert Stirling - Hamilton, Bart.	Brigadier G. E. Thobron	Air Commodore C. W. Busk
Ceylon.. ..	Captain W. E. Banks, Captain-in-Charge, Ceylon	Brigadier F. S. Reid	
India	—	Brigadier W. W. A. Loring	Wing Commander A. M. Montague-Smith
New Zealand ..	Captain M. Richmond	Colonel D. E. B. Talbot	Group Captain M. L. Heath
Pakistan ..	—	Brigadier A. P. Block	Wing Commander R. M. Bradley
South Africa ..	—	Brigadier C. E. R. Hirsch	Air Commodore G. S. Shaw

COMMONWEALTH OFFICERS IN LONDON

	Naval	Army	Air
Australia ..	Captain (S.) P. Perry	Brigadier E. W. Woodward	Air Officer Commanding—Air Commodore E. C. Knox-Knight
Canada ..	Captain O. C. S. Robertson, Naval Member of Canadian Joint Staff, London.	Brigadier E. C. Plow	Senior Canadian Liaison officer — Air Commodore J. L. Hurley
India	Captain B. A. Samson	Brigadier Harnarain Singh	Air Adviser to H.C. for India — Group Captain E. W. Pinto
New Zealand ..	Commander R. E. Harding	Brigadier G. H. Clifton	Senior Air Staff Officer —Wing Commander R. W. Trigance
Pakistan ..	Commander Rashid	Brigadier Ghawas	Air Adviser to H. C. for Pakistan—Group Captain M. Rabb.
South Africa ..	(Air Adviser)	Military Adviser to High Commissioner Brigadier N. G. Willmott	Air Liaison Officer—Lieut. - Colonel C. Gey-Van-Pittius.

HEADS OF BRITISH SERVICES MISSIONS IN FOREIGN COUNTRIES

UNITED NATIONS. MILITARY STAFF COMMITTEE

Air Vice-Marshal G. E. Gibbs (*Chairman*).
Rear-Admiral Lord Ashbourne.
Colonel J. G. E. Reid.

BRITISH JOINT SERVICES MISSION. WASHINGTON

Marshal of the Royal Air Force Lord Tedder (*Chairman*).
Admiral Sir F. H. G. Dalrymple-Hamilton.
General Sir Neil M. Ritchie.
Air Chief Marshal Sir George C. Pirie.

ALLIED POWERS, JAPAN. H.Q. OF SUPREME COMMANDER

Brigadier A. K. Ferguson.
Commander J. M. D. Gray.
Group Captain G. R. Montgomery.

BURMA

Lieutenant Commander J. G. Brookes.
Major-General B. Temple.
Group Captain F. J. Manning.

EIRE

Brigadier R. D. M. C. Miers.

ETHIOPIA

Major-General D. J. T. Turnbull.

GREECE

Rear-Admiral R. K. Dickson.
Major-General C. D. Packard.
Air Commodore W. H. Merton.

SAUDI ARABIA

Brigadier J. E. A. Baird.

BRITISH SERVICE ATTACHÉS ABROAD

Country	Naval	Military	Air
Afghanistan	—	Colonel J. H. Prendergast	—
Argentine	Captain C. B. Alers-Hankey§	Brigadier R. G. Fullerton	Air Commodore H. E. Walker
Belgium	(Naval Attaché to Netherlands)	Colonel P. D. Fabin	Group Captain J. Grandy
Brazil	Captain R. C. M. Duckworth*	Brigadier J. O'Dwyer	Air Commodore D. D. Bayne
Bulgaria	(Naval Attaché to Poland)	Colonel E. S. Batchelor	—
Burma	—	—	Group Captain F. J. Manning
Chile	Captain J. J. Weld †	—	—
China	Commander J. Pringle	(Air Attaché)	Air Vice-Marshal J. Warburton
Czechoslovakia	—	Colonel F. A. A. Blake	Wing Commander G. F. A. Skelton
Denmark	Commander R. S. Christian-Edwards	Lieut.-Colonel E. L. C. Edlmann	Wing Commander N. A. N. Bray
Egypt	Captain H. P. Henderson	Brigadier R. N. Thicknesse	Air Commodore G. W. Hayes
Finland	(Naval Attaché to Soviet Union)	Colonel J. H. Magill	Wing Commander D. H. Fleet
France	Captain C. D. Howard-Johnstone	Brigadier G. A. C. MacNab	Air Vice-Marshal R. A. George
Greece	—	Colonel J. A. S. Crum	—
Hungary	(Naval Attaché to Poland)	Colonel R. D. Blackie	Wing Commander A. N. Davis
Indo-China	(Naval Attaché to Thailand)	—	Squadron Leader M. J. S. Wilton
Indonesia	—	Colonel J. F. Whidborne	Squadron Leader H. W. G. Andrews
Israel	—	Lieut.-Colonel P. Pender-Cudlip	Wing Commander J. A. O'Neill
Iraq	—	Brigadier J. H. Orlebar	—
Italy	Captain N. S. Henderson	Colonel E. R. Colwill	Group Captain A. G. Adnams
Jugoslavia	Commander H. F. Robertson-Aikman	Colonel C. H. Dewhurst	Wing Commander P. J. Sanders
Mexico	—	—	Wing Commander A. F. Johnson
Netherlands	Commander W. E. J. Eames	Colonel R. A. G. Bingley	Group Captain J. M. D. Ker
Norway	Commander J. H. Crawford	Colonel K. Treseder	Wing Commander J. B. Coward
Poland	Captain R. G. Mills	Colonel T. A. H. Coltman	Group Captain C. E. S. Lockett
Portugal	Commander A. R. Cheyne	Lieut.-Colonel W. L. Consett	Wing Commander C. E. A. Garton
Persia	—	Lieut.-Colonel D. L. Betts	Wing Commander W. I. C. Inness
Peru	(Naval Attaché to Chile)	—	Group Captain E. S. Finch
Roumania	(Naval Attaché to Poland)	Colonel R. G. Turner	Wing Commander R. E. G. Brittain
Soviet Union	Captain R. I. A. Sarell	Colonel C. D. T. Wynn-Pope	Air Commodore I. C. Bird

Spain	Commander W. F. R. Segrave	Brigadier A. Murray	(Naval Attaché)
Sweden	Commander D. W. Wyburd	Lieut.-Colonel P. H. Graves-Morris	Wing Commander M. Wyatt
Switzerland	—	Lieut.-Colonel D. J. R. Parker	Wing Commander I. J. Barclay
Syria	—	Lieut.-Colonel V.D'O. Harmar	—
Thailand	Commander D. F. Townsend	Colonel V. L. M. Wainright	Wing Commander J. W. H. Whitworth
Turkey	Captain J. R. S. Brown	Brigadier C. R. A. Swinnerton	Air Commodore R. J. Legg
United States	Captain J. Holmes‡	Lieut.-Colonel J. C. Windsor-Lewis	Group Captain R. C. Jonas

* Also accredited to Venezuela. † Also accredited to Peru, Colombia and Ecuador. ‡ Also accredited to Panama.
§ Also accredited to Uruguay and Paraguay.

ASSISTANT ATTACHÉS

Country	Naval	Military	Air
Burma	—	—	Squadron Leader G. A. Cooke
Czechoslovakia	Commander (E.) E. A. Read (Technical)	—	—
Denmark	Commander (E.) H. G. R. Binning (Technical)	—	—
Egypt	—	—	Squadron Leader D. A. Stevenson
France	Commander D. K. Buchanan-Dunlop, (Air)	—	Wing Commander E. G. Campbell-Voullaire
,,	Commander (E.) E. A. Read (Technical)	—	Wing Commander W. G. Moseby
Italy	Commander (E.) E. A. Read (Technical)	—	—
Netherlands	Commander (E.) E. A. Read (Technical)	—	—
Poland	—	—	Squadron Leader F. J. French
Soviet Union	Lieutenant M. H. T. Gibson-Craig-Alford	—	Squadron Leader G. Young Flight Lieutenant L. S. Denyer
Sweden	Commander (E.) H. G. R. Binning (Technical)	—	—
Switzerland	Commander (E.) E. A. Read (Technical)	—	—
Turkey	Lieut.-Commander G. V. Corbett (at Istanbul)	—	Squadron Leader W. T. Brooks

FOREIGN SERVICE ATTACHÉS IN LONDON

Country	Naval	Military	Air
Argentine	Rear-Admiral Victorio Malatesta	Colonel Alberto J. E. Morello	Commandante E. S. von Borowski
Belgium	(Military)	Colonel A. Bigwood	Major J. Ceuppens
Brazil	Captain Mandel R. de Castilho	Brigadier General Floriano de Lima Brayner	Air Brigadier Fabio de S^{e}-Earp
Burma	(Military)	Major General Tun Hla Oung	(Military)
Chile	Captain Kaare Olsen	—	Commandante A. Solminihac
China	—	—	—
Czechoslovakia	(Military)	Colonel M. Langer	(Military)
Denmark	Commodore H. A. Nyholm	H. H. Prince Georg of Denmark	(Naval)
Egypt	(Air)	Lieut.-Colonel Mohammad Hamdi el Maghraby	Group Captain H. Mahmoud
Finland	(Military)	Major Birger Rolf Ek	(Military)
France	Rear-Admiral M. J. Adam	Brigadier General Maurice Armand Durosoy	Air Brigadier General P. Stehlin
Greece	Captain George Bakas	Colonel Orpheus Antzous	(Naval)
Italy	Captain Paolo Mengarini	Lieut.-Colonel Melchiorre Jannelli	Lieut.-Colonel D. S. Fanali
Jordan	—	Major Kemal Homoud	(Military)
Mexico	Commander Jose H. Orozco	(Naval)	(Naval)
Netherlands	Commander P. A. Mulock van der Vlies Bik	Colonel J. K. H. de Roc Van Alderwerelt	Colonel H. E. C. Holtz
Norway	Commodore Hans P. Henriksen	Colonel A. F. Munthe	Colonel H. Jörgensen
Poland	(Military)	Colonel Maksymiljan Chojecki	—
Portugal	Commander Jose C. Da. Rocha	Lieut.-Colonel Luiz M. Da C. Pina	(Naval)
Soviet Union	Captain, 1st Cl., Georgi P. Timchenko	Colonel I. P. Gorshkov	Major General V. P. Chetverikov
Spain	Commander Ignacio Martel	Colonel Don Joaquin De. Y. Y. Arostegui	Lieut.-Colonel Don Carlos Rute
Sweden	Commodore B. F. G. E. Thermenius	Lieut.-Colonel Arne E. Francke	Lieut.-Colonel N. M. Von Arbin
Switzerland	—	Colonel Jean D. Rieser	(Military)
Thailand	Captain Swai Sribhadung	Colonel M. C. Jitjanok Kritakara	(Military)
Turkey	Captain Tevfik Sargut	(Naval)	Lieut.-Colonel S. Atikkan
United States	Rear-Admiral D. S. Cornwell	Major General John W. Leonard	Brigadier General J. B. Ackerman
Uruguay	—	Colonel Carmelo M. Bentancur	(Military)
Yugoslavia	(Military)	Colonel Aleksandar Vukotic	(Military)

EXPANSION OF THE ARMED FORCES

MEMORANDUM TO THE UNITED STATES

THE following Memorandum, which had been addressed to the Government of the United States, was published by H.M. Government on August 3, 1950.

His Majesty's Government in the United Kingdom have been requested by the United States Government to inform them concerning the nature and extent of the increased effort, both as regards increases in forces, and increases in military production, which his Majesty's Government are willing and able to undertake, as well as information concerning additional military production programmes which could be initiated with United States assistance. His Majesty's Government welcome this further initiative by the Government of the United States.

Before the aggression in Korea, the United Kingdom was spending on Defence £780 million a year, and an additional immediate programme of £100 million on arms and equipment has now been put in hand. Forces are being provided for Korea, and orders have been issued calling up reservists for the Army and Navy.

Since the end of the war the United Kingdom has maintained compulsory military service. About 1 million young men have received compulsory military training since June, 1945, and since the beginning of 1949 compulsory military service has been followed by compulsory reserve service in Territorial and other auxiliary formations for a period of four years. There is, therefore, a substantial and steadily increasing reserve of young trained man-power in addition to the Regular Army reserve and over 4 million older men who received military training in the last war. The United Kingdom Government therefore consider that, in present circumstances, and even after taking into account finished equipment under the terms of the Mutual Defence Act, the most urgent need is to increase the production of defence equipment.

The new programme which his Majesty's Government now put forward would increase defence expenditure in the United Kingdom to a total of £3,400 million over the next three years, or an average of over £1,100 million a year. This means that his Majesty's Government are prepared in principle to increase the total defence expenditure of the United Kingdom from nearly 8 per cent. of the national income to 10 per cent. But how far it will be possible to go towards the new and upper limit will depend on the amount of United States assistance forthcoming.

In reaching this decision his Majesty's Government are conscious that an addition of this size to their already high defence expenditure will inevitably slow down the post-war recovery of the United Kingdom economy which is already fully stretched. But they are anxious to make this effort as their contribution to the defence of the free world in the present threatening situation. It is the largest programme practicable within the period envisaged and without restoring the direction of labour, the requisitioning of factories, or embarking on the slow progress of building and equipping new industrial capacity, which could not have rapid results.

A larger defence programme would not be consistent with the view expressed by the United States Government that "the continuance of economic recovery in the near future—though possibly at a less rapid rate than heretofore—will be essential, not only to the attainment of the broad objective, but to the attainment of the immediate objective of greater military strength."

To implement the full three-year programme of £3,400 million would entail very heavy costs in payment of necessary dollar and other imports, loss of exports and reduction of essential home investment. This burden would be so heavy that it would be impossible to carry out the full programme without substantial United States assistance in addition to the completion of the European Recovery Programme. Even so it will entail real and substantial sacrifices by the British people. It will delay the recovery, and postpone the improvement in their circumstances, for which they had hoped as a result of their efforts since the end of the war.

His Majesty's Government do not, therefore, feel able to undertake consistently with the objectives indicated by the United States Government so full a diversion of productive resources to defence purposes unless the United States can offer financial assistance. While a large part of this assistance would of course be required to pay for materials, machine tools, components, and balancing items from the United States itself, in the circumstances it is essential that the remainder should be dollars which can be used in any part of the world. Early deliveries of machine tools, raw materials, and other items from United States sources are essential to the execution of these programmes.

Given United States assistance, the increase in the United Kingdom armament production should enable some deficiencies in the equipment of the North Atlantic Treaty Organization forces of other nations to be met as well as of the United Kingdom forces. In view of the necessity of building up the defence of the Atlantic Powers and of utilizing the resources of all the N.A.T.O. Powers on a co-ordinated basis, his Majesty's Government propose to transfer free of charge items of equipment of United Kingdom origin supplied to those North Atlantic Treaty countries for the equipment of their forces under agreed plans for balanced collective defence. An arrangement of this kind might well be of reciprocal application.

Estimates based on these proposals will be submitted to Parliament in due course, but this cannot be done until arrangements have been completed with the United States Government.

A copy of this memorandum is being communicated to the Chairman of the deputies of the Atlantic Council through the United Kingdom deputy.

INCREASE IN THE LENGTH OF FULL-TIME NATIONAL SERVICE WITH THE ARMED FORCES

(Cmd. 8026)

1. His Majesty's Government have had under consideration the manpower of the armed forces, in the light of the present international situation, and of the increased calls which have been and may be made on the services to support the policy of the United Nations and to carry out the defence commitments of this country, in conjunction with our Allies.

2. In the light of our increased commitments the manpower situation gives cause for disquiet. The number of regulars has not built up as rapidly as was hoped when regular recruiting was resumed after the war. In 1947, 95,500 men joined the services either on normal regular or short-term bounty engagements; in 1948 this number had dropped to 67,200 and in 1949 to 52,300. The figures for the first six months of the present year show a continued downward trend. The effect of recruiting deficiencies on the regular strengths of the services has, moreover, been accentuated by the fact that far too few men completing their first terms of regular engagements are extending their service or re-engaging for further periods with the colours.

3. As a result, there is a serious lack of balance between the regular and national service components of the Army and Air Force. The Navy, which now takes no more than a token number of national service men, is not similarly affected. All three services, however, and particularly the Navy and Air Force, are seriously short of experienced men, including technicians and specialists, because of the inadequate numbers extending their service or re-engaging.

4. His Majesty's Government have decided that urgent steps must be taken to attract more recruits to the services on voluntary regular engagements, and also to encourage a greater proportion of men of long service to remain in the forces. Command Paper 7895—Statement on Defence, 1950, set out the various measures for improving general conditions of employment in the services, which are in hand. These are important and are being pursued. To these are now added the increases in service rates of pay and the re-engagement and bounty schemes, set out in Cmd. 8027, which are designed to attract additional numbers of men to regular engagements in the forces where they can look for a satisfactory career, with emoluments comparing favourably with those which they might expect to obtain in civilian life and with good prospects of earning promotion to the higher ranks. But it will be some time before the full benefit of these measures is felt.

5. When the scheme of national service was first presented to Parliament in 1947, the Government stated that they had two main objects in view. In the first place, national service was intended to build up, in a few years, large reserves which would be ready in emergency, without a lengthy period of training, to serve in operational formations. Secondly, until the regular components of the armed forces could be built up,

national service men would, in the later stages of their full-time service, be able to supplement regulars in carrying out the day-to-day commitments of the forces. It was the Government's hope that the world-wide commitments which this country faced when the war ended would diminish in the succeeding years. This hope, reasonable enough at the time, has been falsified by events; and the developing international situation had already, by the end of 1948, shown the need for extending the period of full-time service to 18 months. This was effected by the National Service (Amendment) Act of December, 1948.

6. Even so, the proportion of his full-time service during which a national service man can be an effective member of a unit is all too short. In the Army, for example, national service men have, in the main, necessarily been employed in units stationed near home such as those in Germany and Austria. The result has been that such units have come to contain too high a proportion of national service men and cannot readily be moved in emergency to other theatres without major transfers of personnel. Many national service men have, it is true, given valuable service in the Middle East and Far East but this has been at the price of unduly frequent personnel movements which are bound to be uneconomical and to prejudice efficiency.

7. The Government have therefore decided to recommend to Parliament that, in the present international situation, the period of full-time service of national service men should be extended from 18 months to 2 years. A short Bill to effect this change will be laid before Parliament in the near future. It is intended that this increased length of service will apply to those still serving on October 1, 1950, or who are called up thereafter, though arrangements will be made for the consideration of cases of special hardship. The most important advantage will be the addition to the forces, over the next six months, of some 77,000 trained men; about 55,000 for the Army, 18,000 for the Air Force and 4,000 for the Navy. This will be of particular help in manning the overseas theatres, since the extension of full-time service will enable national service men to render a longer period of effective service as trained men. Many of them will be junior N.C.Os. and as such will be able to train both new national service entries and the additional regular recruits who, it is hoped, will now join.

8. The increase in the length of full-time service will be accompanied by a corresponding reduction in the period of reserve service; this is at present 4 years, and will, subject to the approval of Parliament, be reduced to 3½ years. One effect of the extended period of national service will be to slow down temporarily the build-up of the auxiliary forces by delaying the entry of national service men whose full-time service is complete. This, however, must be accepted; there is, of course, the compensation that the national service men when they finally join the auxiliary forces will be better trained as a result of their longer colour service.

9. In reaching their decision to extend the period of colour service the Government have considered the effect upon industry of keeping some 77,000 national service men in the forces. Serious though their loss is at a time when additional burdens are being placed on industry the men thus withheld from industry are young and can be spared with less

difficulty than those of longer industrial experience in the civilian labour force. Moreover, the numbers do not represent a major additional diversion of manpower to the forces in relation to the working population of this country as a whole. The difficulties do not in the Government's view outweigh the need for the immediate accretion of strength to the armed forces which the extension of service will achieve.

10. It is only after the most careful consideration that the Government have decided to recommend this action to Parliament. They have a clear duty to take effective action to increase the strength of the forces in the present serious international situation. To meet the immediate need for experienced men, the Navy and the Army have already found it necessary to retain men due for release at the normal termination of regular engagements, and the Air Force will now be taking similar action. The Navy and Army have also found it necessary to call up a proportion of their trained reserves. The increases in pay and other financial benefits mentioned above are designed to attract larger numbers of men to normal regular engagements in order to build up the regular component of the forces. This is, however, a policy which will require time to become effective. In the meantime, the only effective way quickly to strengthen the services, apart from the emergency measures already mentioned, is to retain national service men for an extra period. It is the Government's hope that as the regular component of the services increases, it will be possible to review again the length of full-time national service. But the results of any such review must depend in the main upon developments in the international situation.

September, 1950.

SERVICE EMOLUMENTS

(Cmd. 8027)

1. Command Papers 6715 of December, 1945, and 6750 of March, 1946, described new codes of pay for the forces which were designed to produce broad equality of treatment between the services and at the same time to simplify considerably the previous pay codes. In both cases it was stated that the rates of pay and allowances then promulgated would be subject to review from time to time though changes would not be made except in the event of a marked alteration in conditions.

2. In November, 1948, certain increases in the rates of marriage allowance for all regular personnel and of pay for members of the regular forces below officer rank were announced in Parliament. Details were published in Command Paper 7588 of December, 1948.

3. His Majesty's Government have now further reviewed the position in the light of the urgent need to increase substantially, both in numbers and experience, the regular strength of the forces. They have had regard also to the opportunities open to men and women in civilian life. As a result they have decided on a series of measures falling under three broad headings; first, increases in pay; second, improved careers and opportunities for advancement; and third, temporary additional inducements in the shape of cash bounties to re-enlist or to extend engagement periods.

BASIC PAY

4. There will be increases in the pay of all ranks of the regular forces, men and women, up to the rank of Brigadier and equivalent, except national servicemen who are dealt with in paragraph 8 below. A broad outline of these increases is set out in Appendix I. A further statement will be made shortly about officers above the rank of Brigadier.

5. The new rates of pay, resulting from these increases, for male officers are set out in Appendix II, those for male other ranks and ratings are at Appendix III.

6. These rates of pay are, of course, exclusive of the provision of clothing (below officer rank) and of food and accommodation or allowances in lieu. They are also exclusive, in the case of those members of the forces who are married, of marriage allowance which will continue at the existing rates. For convenience these rates are set out in Appendix VI. There will, however, be increases in the rates of allotments which service men below officer rank are required to make from their pay to their families as a condition of the issue of marriage allowance; details of these increases are also given in Appendix VI.

7. Members of the women's services including the forces nursing services will receive increases in pay amounting to approximately three-quarters of those for their corresponding male ranks.

8. The increased rates of pay detailed in these appendices will be granted to national service men, including those who are officers, after they have served 18 months of their period of full-time service; thus, such officers

and men will receive the increased rates of pay during the extra six months of full-time service for which, as stated in Command Paper 8026, it is proposed to seek the approval of Parliament.

FLYING PAY (ROYAL NAVY AND ROYAL AIR FORCE)

9. It has been decided to introduce flying pay for the Royal Air Force and to increase the existing rates of flying pay for the Royal Navy at rates varying according to rank, for all officers and men who are appointable for flying duties. Flying pay will be in addition to the normal remuneration of the rank; the rates are set out in Appendix IV. For convenience they are also given, for the appropriate ranks, in Appendices II and III. The gratuities payable to commissioned aircrew officers and to other rank aircrew at the end of short service engagements will also be increased as follows: for officers, from £700 to £1,500; for aircrew pilots and navigators, from £320 to £600, and for aircrew signallers, engineers and gunners, from £256 to £480.

DATE OF EFFECT

10. The new rates of pay and flying pay will take effect from September 1, 1950, and will be paid as soon as possible.

CAREERS

11. A revised trade and career structure for the Royal Air Force has recently been announced and will be introduced in January 1 next. The effect of the changes proposed on pay are given in Appendix III (Table IIIB). The pay code for ratings in the Royal Navy has been revised in order to provide additional rewards for higher qualifications. Details are given in Appendix III (Table I). A scheme designed to provide improved prospects for all ranks in the Army, particularly those with technical qualifications, is under urgent examination.

BOUNTIES FOR RE-ENLISTMENT, RE-ENGAGEMENT AND EXTENSIONS OF SERVICE

12. In order to encourage highly trained men who are serving on 12 years' regular engagements to re-engage for a further period and to meet a special need in the Army for men who are serving on engagements of less than 12 years with the colours to extend their colour service, it is proposed to introduce, temporarily, substantial re-engagement and extension bounties. Bounties will also be offered, under certain conditions, to men with recent previous experience who enlist on regular engagements. The bounties will be tax-free. It is intended that these schemes should be terminated on December 31, 1951. Details are given in Appendix V.

APPENDIX I

PAY INCREASES

(i) *Officers*

	Daily Increases	Annual Increases
	s. d.	£
Midshipman, Sub-Lieutenant, Lieutenant, R.N. (up to 4 years' service in the rank), 2nd Lieutenant, Lieutenant—Army, Pilot Officer, Flying Officer—R.A.F.	4 6	82
Lieutenant R.N. (more than 4 years' service in the rank), Captain, Flight Lieutenant	6 0	110
Lieutenant-Commander, Major, Squadron Leader	7 0	128
Commander, Lieutenant-Colonel, Wing Commander, Captain, R.N., Colonel, Group Captain, Brigadier, Air Commodore	8 0	146

(ii) *Other Ranks and Ratings*

	Weekly Increases
	s. d.
Leading Seaman, Corporal and below..	21 0
Petty Officer, Sergeant	31 6
Chief Petty Officer, Staff Sergeant, Flight Sergeant	38 6
Army and R.A.F. Warrant Officer, R.M. Sergeant Major and Quartermaster Sergeant	42 0

Notes:

(*a*) These increases will apply broadly to all officers and other ranks with the following exceptions:—

- (i) Officers and men serving under the National Service Act during their first 18 months whole-time service.
- (ii) Separate consideration is being given to the position of the Medical, Dental, Veterinary, and Chaplains Services, of Quartermasters, and of officers employed in certain legal, educational and other special duties.
- (iii) The Admiralty have reviewed the Naval Pay Code for ratings and a revised Code has now been adopted which will give opportunities of earning extra pay by the acquisition of extra qualifications on the general lines of the pre-war system of non-substantive pay, though in a much simpler form. In consequence the pay increases for ratings vary to some extent from those indicated above.

(*b*) Increases in pay for members of the women's forces including the nursing services, in accordance with present relativities, will be approximately three-quarters of the rates shown above. Women Medical and Dental Officers will receive the same scale of increases as male Medical and Dental Officers when these are decided.

(*c*) Increases for Branch Officers (Royal Navy) will be:—

Commissioned Officers, Branch List, 4*s*. 6*d*. a day.
Senior Commissioned Officers, Branch List, 6*s*. a day.
Lieutenants and Lieut. Commanders, Branch List, 7*s*. a day.

(*d*) Increases for officer cadets will be:—

- (i) for cadets in the Army and Royal Air Force, 3*s*. a day;
- (ii) for Naval cadets in training ships, 1*s*. 6*d*. a day, or in ships of the Fleet, 2*s*. 6*d*. a day.

(*e*) Increases for apprentices and boys will be on the following scale (per week):—

Present rate	*Increase*
s. d.	*s. d.*
10 6	7 0
14 0	10 6
17 6	10 6

(*f*) These increases do not apply to local personnel recruited overseas.

APPENDIX II

Daily and Annual Rates of Basic Pay for Officers

TABLE I: ROYAL NAVY

This table incorporates the new rates of flying pay for officers appointable for flying ***duties***

Rank	New rates of basic pay		Flying pay	
	Daily	Annual	Daily	Annual
	s. d.	£	*s. d.*	**£**
Cadet in Training Ship	4 0	73	—	—
Cadet in Ship of Fleet	7 6	137	—	—
Midshipman	12 0	219	—	—
Acting Sub-Lieutenant	15 6	283	7 0	**128**
Sub-Lieutenant	17 6	319	8 0	**146**
Lieutenant	21 6	392	9 0	**164**
after 2 years	23 6	429	12 0	**219**
after 4 years	30 0	548	12 0	**219**
after 6 years	32 0	584	12 0	**219**
Lieutenant-Commander	39 0	712	12 0	**219**
after 2 years	41 0	748	12 0	**219**
after 4 years	43 0	785	12 0	**219**
after 6 years	45 0	821	12 0	**219**
after 8 years	47 0	858	10 0	**182**
after 10 years	49 0	894	8 0	**146**
Commander	55 6	1,013	5 0	**91**
after 2 years	58 0	1,059	5 0	**91**
after 4 years	60 6	1,104	5 0	**91**
after 6 years	63 0	1,150	5 0	**91**
after 8 years	65 6	1,195	5 0	**91**
Captain	73 0	1,332	5 0	91
after 2 years	76 0	1,387	5 0	91
after 4 years	79 0	1,442	5 0	91
after 6 years	82 0	1,497	3 0	55
after 8 years	85 0	1,551	—	—

(i) The new rates of flying pay for Branch Officers will be :—

Commissioned Officers, Branch List, 7*s*. a day.
Senior Commissioned Officers, Branch List, 8*s*. a day.
(Increases in basic pay are shown in Appendix I.)

(ii) The new rates of flying pay for officers under flying training will be 3*s*. **a** day, irrespective of rank, up to and including the rank of Captain.

APPENDIX II—*continued*

TABLE II: ARMY

Rank	New rates of basic pay	
	Daily	Annual
	s. *d.*	£
Second-Lieutenant	17 6	319
Lieutenant	19 6	356
After 2 years	21 6	392
After 3 years	23 6	429
Captain	29 0	529
After 2 years	31 0	566
After 4 years	33 0	602
After 6 years	35 0	639
Major	42 0	767
After 2 years	44 0	803
After 4 years	46 0	840
After 6 years	48 0	876
Lieutenant-Colonel:		
With less than 19 years' service	55 6	1,013
After 2 years or with 19 years' service	58 0	1,059
After 4 years or with 21 years' service	60 6	1,104
After 6 years or with 23 years' service	63 0	1,150
After 8 years or with 25 years' service	65 6	1,195
Colonel	73 0	1,332
After 2 years	76 0	1,387
After 4 years	79 0	1,442
After 6 years	82 0	1,497
Brigadier	85 0	1,551

Note.—Specially qualified officers, with not less than two years' commissioned service, of the rank of Major and below, receive, in addition, Qualification Pay as follows;—

Lieutenant	2*s.* 6*d.* a day (£46 a year)
Captain	4*s.* 0*d.* a day (£73 a year)
Major	5*s.* 0*d.* a day (£91 a year)

APPENDIX II—*continued*

TABLE III: ROYAL AIR FORCE

This table incorporates the new rates of flying pay for officers appointable for flying duties

Rank	New rates of basic pay		Flying pay	
	Daily	Annual	Daily	Annual
	s. d.	£	*s. d.*	£
Pilot Officer	17 6	319	7 0	128
Flying Officer	19 6	356	8 0	146
After 2 years	21 6	392	8 0	146
After 3 years	23 6	429	8 0	146
Flight Lieutenant	29 0	529	9 0	164
After 2 years	31 0	566	9 0	164
After 4 years	33 0	602	9 0	164
After 6 years	35 0	639	9 0	164
After 8 years (General Duties Branch only)	37 0	675	9 0	164
Squadron Leader	42 0	767	9 0	164
After 2 years	44 0	803	9 0	164
After 4 years	46 0	840	9 0	164
After 6 years	48 0	876	9 0	164
Wing Commander	55 6	1,013	5 0	91
After 2 years	58 0	1,059	5 0	91
After 4 years	60 6	1,104	5 0	91
After 6 years	63 0	1,150	5 0	91
After 8 years	65 6	1,195	5 0	91
Group Captain	73 0	1,332	5 0	91
After 2 years	76 0	1,387	5 0	91
After 4 years	79 0	1,442	5 0	91
After 6 years	82 0	1,497	3 0	55
Air Commodore	85 0	1,551	—	—

APPENDIX III

New Weekly Rates of Pay for Ratings, Other Ranks and Aircrew

TABLE I: ROYAL NAVY

Ratings in the Royal Navy will, from September 1, 1950, have a new Pay Code which will give extra pay for higher qualifications. Except in the Artificer, Mechanician, Artisan and Aircrew branches, there will be several different rates of pay in each rating—Rate A for the man with the minimum qualification, rate B for a higher qualification, and so on.

Seaman Branch

	A	B	C	D
	s. d.	s. d.	s. d.	s. d.
Ordinary rating	49 0	56 0	59 6	—
Able rating	66 6	70 0	73 6	77 0
Leading rating	84 0	91 0	94 6	98 0
Petty Officer rating	115 6	119 0	122 6	—
Chief Petty Officer rating	133 0	140 0	147 0	—

Other Branches

	A		B	
	s.	d.	s.	d.
Ordinary rating	49	0	56	0
Able rating	66	6	73	6
Leading rating	91	0	98	0
Petty Officer rating	119	0	122	6
Chief Petty Officer rating	140	0	147	0

Artificers

	s.	d.
Artificer, 5th Class (Leading rating)	91	0
Artificer, Acting 4th Class (Acting Petty Officer)	126	0
Artificer, 4th Class (Petty Officer)	129	6
Artificer, 3rd Class (Chief Petty Officer)	150	6
Artificer, 2nd Class Artificer, 1st Class (Chief Petty Officer)	157	6
Chief Artificer (Chief Petty Officer)	168	0

Mechanicians

	s.	d.
Mechanician, 3rd Class Mechanician, 2nd Class (Petty Officer)	122	6
Mechanician, 1st Class (Chief Petty Officer)	147	0
Mechanician, 1st Class (C.P.O.)—after 3 years as Mechanician	154	0
Mechanician, 1st Class (C.P.O.)—after 5 years as Mechanician	157	6
Chief Mechanician (Chief Petty Officer)	168	0

APPENDIX III—*continued*

TABLE I—*continued*

Artisans

(Blacksmiths, Joiners, Painters and Plumbers)

	s.	d.
Artisan, 5th Class (Able rating)	73	6
Artisan, Acting 4th Class (Leading rating)	91	0
Artisan, 4th Class (Leading rating)	98	0
Artisan, 3rd Class Artisan, 2nd Class (Petty Officer) Artisan, 1st Class	122	6
Chief Artisan (Chief Petty Officer)	147	0

Aircrew

	s.	d.
Pilot IV	115	6
Pilot III	154	0
Pilot II Aircrewman II	157	6
Pilot I Aircrewman I	192	6

Telegraphists (Flying) will receive their normal rate of pay as Telegraphists with the addition of flying pay at the rate of 3*s*. 6*d*. a day.

Progressive Pay

The existing increments of 2*d*. a day for men below leading rating and 3*d*. a day for leading ratings and above for each period of 2 years' man's service are abolished, and progressive pay will be granted at the rate of 6*d*. for each 4 years' service in the rating subject to a maximum of 1*s*. 6*d*. in all ratings except Chief Petty Officer.

Badge Pay

Up to three Good Conduct Badges may be awarded under existing regulations after 4, 8 and 12 years' service respectively and the rate of payment for each badge will continue at 4*d*. a day.

Royal Marines

A new Pay Code for the Royal Marines will be introduced as soon as possible and in the meantime the following increased rates of pay will be granted.

	Weekly s.	d.
Marine 2nd Class on entry	49	0
Marine 2nd Class after 26 weeks	56	0
Marine 1st Class	66	6
Corporal	80	6
Sergeant	105	0
Colour Sergeant	122	6
Quartermaster Sergeant	129	6
Regimental Sergeant Major	140	0

Increments and Badge Pay

These remain unchanged for the present. Increments are; Marines 2*d*. a day and Corporals and above 3*d*. a day for each 2 year period of man's service. Up to three Good Conduct Badges may be awarded after 4, 8 and 12 years' service, respectively. The rate of payment for each badge is 4*d*. a day.

TABLE II: ARMY

Private, Lance-Corporal, Corporal

Rank	Entry	1 Star	2 Star	3 Star	4 Star	5 Star	6 Star
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Private	49 0	56 0	59 6	66 6	70 0	73 6	80 6
Lance-Corporal	—	59 6	63 0	70 0	73 6	77 0	84 0
Corporal	—	73 6	77 0	84 0	87 6	91 0	98 0

APPENDIX III—*continued*

TABLE II—*continued*

Sergeants and Higher Ranks

	Group "A" Class I		Others	
	s.	d.	s.	d.
Sergeant	126	0	115	6
Staff Sergeant	150	6	133	0
Warrant Officer II	157	6	143	6
Warrant Officer I	171	6	157	6

Incremental Pay

(*a*) Soldiers, whatever their rank, receive 3*s*. 6*d*. a week after 5 years' man's service and a further 3*s*. 6*d*. a week after 10 years' man's service.

(*b*) Increments for length of service *in the rank* are payable as follows:—

Corporal	3*s*. 6*d*. a week after 4 years' service.
Sergeant; Staff Sergeant; Warrant Officer II	3*s*. 6*d*. a week after *each* period of 4 years' service.
Warrant Officer I	10*s*. 6*d*. a week after *each* period of 4 years' service.

TABLE III: ROYAL AIR FORCE

A. EFFECT OF INCREASES APPLIED TO EXISTING TRADE STRUCTURE

Rank	Entry		Group D		Group C		Group B		Group A	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Aircraftman 2nd Class	49	0	56	0	59	6	66	6	77	0
Aircraftman 1st Class	—		63	0	66	6	70	0	80	6
Leading Aircraftman	—		66	6	70	0	77	0	84	0
Corporal	—		80	6	84	0	91	0	98	0
Sergeant	—		115	6	115	6	115	6	126	0
Flight Sergeant	—		133	0	133	0	133	0	150	6
Warrant Officer	—		157	6	157	6	157	6	171	6

Good Conduct Badge Pay

Good Conduct Badge Pay is payable at the rate of 3*s*. 6*d*. a week after 5 years' approved service and a further 3*s*. 6*d*. a week after 10 years' approved service.

Incremented Pay

Increments for length of service *in the rank* are payable as follows:—

Corporal	3*s*. 6*d*. a week after 4 years' service.
Sergeant and Flight Sergeant	3*s*. 6*d*. a week after *each* period of 4 years' service up to 16.
Warrant Officer	10*s*. 6*d*. a week after *each* period of 4 years' service up to 8.

APPENDIX III—*continued*

TABLE III—*continued*

B. NEW WEEKLY RATES OF PAY APPLIED TO THE R.A.F. NEW TRADE STRUCTURE WHICH WILL BE INTRODUCED ON 1ST JANUARY, 1951

Rank	Rate of Pay
	s. *d.*
Recruit	**49 0**
Aircraftman 2	**56 0**
Aircraftman 1	63 0
Leading Aircraftmen	70 0
Senior Aircraftman	77 0
Junior Technician	84 0
Corporal Technician	108 6
Senior Technician	136 6
Chief Technician	157 6

	Higher Scale	Lower Scale
	s. *d.*	*s.* *d.*
Corporal	98 0	91 0
Sergeant	126 0	115 6
Flight Sergeant	150 6	133 0
Warrant Officer	171 6	157 6

Good Conduct Badge Pay

Good Conduct Badge Pay will be payable at the rate of 3*s*. 6*d*. a week after 5 years' approved service and a further 3*s*. 6*d*. a week after 10 years' approved service.

Incremental Pay

Increments for length of service *in the rank* will be payable as follows:—

Senior Aircraftman	3*s*. 6*d*. a week after each period of 4 years' service up to 12.
Corporal Technician and Senior Technician	3*s*. 6*d*. a week after 4 years' service.
Chief Technician	7*s*. 0*d*. a week after *each* period of 4 years' service up to 8.
Corporal, Sergeant, Flight Sergeant	3*s*. 6*d*. a week after *each* period of 4 years' service up to 16.
Warrant Officer	10*s*. 6*d*. a week after *each* period of 4 years' service up to 8.

APPENDIX III—*continued*

TABLE III—*continued*

C. AIRCREW

Rank	Pilots and Navigators			Signallers "A" Engineers "A" and Gunners "A"			Signallers, Engineers and Gunners		
	Basic pay	Flying pay	Total	Basic pay	Flying pay	Total	Basic pay	Flying pay	Total
	s. d.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Aircrew cadets—									
During first 6 months	49 0	—	49 0	49 0	—	49 0	49 0	—	49 0
After 6 months ..	56 0	*21 0	77 0	56 0	*21 0	77 0	56 0	*21 0	77 0
After 12 months ..	98 0	*21 0	119 0	94 6	*21 0	115 6	84 0	*21 0	105 0
Sergeant, Aircrew ..	126 0	31 6	157 6	126 0	24 6	150 6	115 6	24 6	140 0
After 4 years.. ..	129 6	31 6	161 0	129 6	24 6	154 0	119 0	24 6	143 6
After 8 years.. ..	133 0	31 6	164 6	133 0	24 6	157 6	122 6	24 6	147 0
After 12 years ..	136 6	31 6	168 0	136 6	24 6	161 0	126 0	24 6	150 6
After 16 years ..	140 0	31 6	171 6	140 0	24 6	164 6	129 6	24 6	154 0
Flight Sergeant, Aircrew	150 6	42 0	192 6	150 6	31 6	182 0	133 0	31 6	164 6
After 4 years.. ..	154 0	42 0	196 0	154 0	31 6	185 6	136 6	31 6	168 0
After 8 years.. ..	157 6	42 0	196 6	157 6	31 6	189 0	140 0	31 6	171 6
After 12 years ..	161 0	42 0	203 0	161 0	31 6	192 6	143 6	31 6	175 0
After 16 years ..	164 6	42 0	206 6	164 6	31 6	196 0	147 0	31 6	178 6
Master, Aircrew ..	171 6	49 0	220 6	171 6	42 0	213 6	157 6	42 0	199 6
After 4 years.. ..	182 0	49 0	231 0	182 0	42 0	224 0	168 0	42 0	210 0
After 8 years.. ..	192 6	49 0	241 6	192 6	42 0	234 6	178 6	42 0	220 6

Note.—* Flying Instructional Pay.

APPENDIX IV

FLYING PAY

Rates of Flying Pay for personnel appointable for flying duties

TABLE I: ROYAL NAVY

Officers

Rank	Daily	Annual
	s. d.	£
Acting Sub-Lieutenant	7 0	128
Sub-Lieutenant	8 0	146
Lieutenant on promotion	9 0	164
Lieutenant after 2 years	12 0	219
Lieutenant-Commander	12 0*	219
Commander	5 0	91
Captain	5 0†	91

* Subject to an overriding maximum (basic pay and flying pay together) of 57*s.* a day.
† Subject to an overriding maximum (basic pay and flying pay together) of 85*s.* a day.

APPENDIX IV—*continued*

TABLE I—*continued*

Ratings

Rating Pilots and other rating aircrew will receive consolidated rates of pay which will exceed the highest rate for equivalent non-flying ratings by the following amounts :—

	Daily	Weekly
	s. d.	*s. d.*
Pilot IV	2 6	17 6
Pilot III	4 6	31 6
Pilot II Aircrewman II	5 0	35 0
Pilot I Aircrewman I	6 6	45 6

TABLE II: ROYAL AIR FORCE

Officers

Rank	Daily	Annual
	s. d.	£
Pilot Officer	7 0	128
Flying Officer	8 0	146
Flight Lieutenant	9 0	164
Squadron Leader	9 0	164
Wing Commander	5 0	91
Group Captain	5 0	91
After 6 years	3 0	55

Aircrew

Rank	Pilots and Navigators		Other aircrew categories	
	Daily	Weekly	Daily	Weekly
	s. d.	*s. d.*	*s. d.*	*s. d.*
Sergeant	4 6	31 6	3 6	24 6
Flight Sergeant	6 0	42 0	4 6	31 6
Master Aircrew	7 0	49 0	6 0	42 0

Note: ARMY

Officers and other ranks in the Army whose normal duties require them to fly will receive increases in the present rates of additional pay for those duties. The new rates are as follows ;

Nature of Duty	Weekly	Annual
	s. d.	£
Air Observation Pilots ; Glider Pilots	35 0	91
Parachutists	28 0	73
R.A.S.C. Air Despatch Crews	10 6	27
Rear Observers (A.O.P. squadrons)	10 6	27

APPENDIX V

BOUNTIES FOR OTHER RANKS AND RATINGS

(*a*) ***Re-enlistment Bounties***

A bounty of £50 (tax free) will be paid subject to certain conditions as regards previous experience, rank and trade classification, to men who, on or after September 1, 1950, and before the date of termination of the scheme, re-enlist on normal regular engagements. This scheme is intended mainly for application to the Army and the Royal Air Force.

The existing bounty schemes, which apply to the Army and Royal Air Force only, and which provide for the payment of both initial and terminal bounties to experienced men who enter into short service engagements of up to 4 years are being withdrawn on August 31, 1950.

(*b*) ***Re-engagement Bounties***

A bounty of £100 (tax free) will be paid to any man who on September 1, 1950, is serving on a regular engagement of 12 years or less and who, on or after that date and before the date of termination of the scheme, re-engages to complete 22 years' service. Only those men who, under service regulations, are eligible to re-engage will be eligible for the bounty. The bounty will not be payable immediately but on the date of entry into re-engaged service whether this is before or after the date of termination of the scheme. This scheme will apply in all three Services.

(*c*) ***Extension Bounties***

In the Army only, a bounty of £50 (tax free) will be payable to any man who, on September 1, 1950, is serving on a regular engagement of less than 12 years with the Colours and who, on or after that date and before the date of termination of the scheme, being eligible to do so, extends his current engagement to serve for 12 years with the Colours. The bounty will be payable at the end of the current engagement. It will be offset against any further payment issuable at the end of the 12-year engagement, e.g., by way of terminal gratuity.

(*d*) ***Date of Termination of Schemes***

It is intended that these bounty schemes will be terminated on December 31, 1951.

APPENDIX VI

MARRIAGE ALLOWANCES

The following are existing rates; which will remain in force:—

(i) *Officers:*—

Rank	Officers in married quarters		Officers not in married quarters	
	Daily	Annual	Daily	Annual
	s. d.	£	*s. d.*	£
Lieutenant-Commander, Major and Squadron Leader, and lower commissioned ranks ..	15 6	283	18 6	338
Captain, R.N., with less than 6 years' service in the rank, Colonel and Group Captain; Commander, R.N., Lieutenant-Colonel and Wing Commander	18 0	329	21 0	383
Captain, R.N., with 6 years' service in the rank, Brigadier and Air Commodore	20 6	374	23 6	429

APPENDIX VI—*continued*

Marriage Allowances—*continued*

(ii) *Other Ranks:*—

Rank	Weekly rate
	s. d.
Leading Seaman, Corporal and below	42 0
Petty Officer, Sergeant	49 0
Chief Petty Officer, Staff Sergeant and Flight Sergeant	52 6
Army and R.A.F. Warrant Officer, R.M. Sergeant Major and Quartermaster Sergeant	56 0

Notes:—

(*a*) The rates shown in table (i) are for regular officers aged 25 and over; married officers under the age of 25 receive the highest "other rank" rate of marriage allowance (56*s*. 0*d*. a week or £146 a year).

(*b*) National Service officers and men receive the lower rates of marriage allowance payable before November, 1948.

(*c*) As explained in Cmd. 6715 (para. 23) other ranks and ratings are required to supplement the rates of marriage allowance payable to their wives by minimum amounts known as qualifying allotments. As a result of the increases in pay now to be given the present weekly rates of qualifying allotment will be increased as follows:—

Rank	Present rates	New rates
	s. d.	*s. d.*
Leading Seaman, Corporal and below	10 6	17 6
Petty Officer, Sergeant	17 6	28 0
Chief Petty Officer, Staff Sergeant Flight Sergeant ..	24 6	38 6
Army and R.A.F. Warrant Officer, R.M. Sergeant Major and Quartermaster Sergeant	28 0	42 0

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